NEW ZEALAND JOURNAL OF Agriculture

· JUNE 1949 ·

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Cooper News
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FARM BULLETIN published by COOPER, McDOUGALL & ROBERTSON (N.Z.) LTD.
World famous Manufacturers of Sheep Dips, Worm Drenches and other Stock Remedies.

No. 5 PUBLISHED EVERY SECOND MONTH JUNE, 1949.

Cooper's *Introduce* . . .

A NEW DAIRY OINTMENT
WITH OUTSTANDING ADVANTAGES

To dairy farmers we announce with pleasure the introduction of COOPER'S DAIRY OINTMENT a product that is entirely different from anything at present available and one having exceptional properties that must make instant appeal.

COOPER'S DAIRY OINTMENT is *not just another dairy ointment as any trial will show.*

Research workers are all agreed on the importance of teat sores, chapped teats, etc., in chronic streptococcal mastitis and recent work in an official laboratory in the United Kingdom has shown that Strep agalactiae will not live for more than a few hours on intact skin though it will persist on abraded or broken skin until healing is completed. This emphasises the need for a really efficient *bactericidal and healing* ointment for general use in the cowshed, and these are the paramount characteristics of COOPER'S DAIRY OINTMENT. Its strong bactericidal properties promote rapid healing of small injuries and hinder the spread of streptococci which tend to develop in such injuries.

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(3) It does *not* form a hard sticky film over the teat and can readily be washed off with warm water without soap.

(4) It will not taint milk.

(5) Its lanoline content is absorbed into the surface layers of the skin and exerts protection against chapping.

(6) It is beneficial to milkers' hands.

(7) It is invaluable as a general veterinary ointment.

(8) With all its advantages Cooper's Dairy Ointment costs only a few pence per cow per year more than ordinary petroleum Jelly.

To put Cooper's Dairy Ointment to the practical test in user's hands we sent out a number of trial samples to dairyfarmers and asked them to answer a questionnaire concerning results.

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QUESTION 1: *Did you find the water-miscible quality of the ointment an advantage from the following points of view?*

	YES	NO	INDEFINITE
(a) Easy penetration of wet surfaces.	26	2	3
(b) Easy to wash off.	27	2	2
(c) Penetration of cuts and scratches	27	0	4

QUESTION 2: *Did you find its non-greasy properties advantageous from the following points of view?*

	YES	NO	INDEFINITE
(a) Easy to rub in.	27	1	3
(b) More pleasant to handle.	24	2	5

QUESTION 3: *Have you had an opportunity of observing the healing effect of the ointment on cuts, scratches, chafed areas or wounds on cattle or other animals? If so, please comment.*

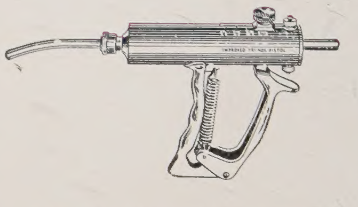
22 said the healing effect was good.
9 said they had not had an opportunity to judge.

QUESTION 4: *Would you use "Cooper's Dairy Ointment" in preference to other preparations you have tried, assuming it is placed on the market at a competitive price?*

21 said Yes.
3 said No.
7 would not commit themselves.

COOPER'S DAIRY OINTMENT is packed initially in 2lb. tins but larger packs will be available shortly. Order from your Deiry Company, Stock and Station Agent or Merchant, to whom supplies will be available from late June.

"TRI-KOS" Drenching Pistol



A perfect precision dosing instrument having the exclusive feature of a piston readily adjustable to the varying consistency of different drenches. Constructed of non-corrosive, heavily nickel-plated metal it is suitable for use with ANY drench. Delivers doses up to 1 fluid oz. and from 5 to 30 c.c.

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COOPER, McDOUGALL & ROBERTSON (N.Z.) LTD., Box 559, Auckland.

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Hon. E. L. Cullen,
Minister of Agriculture.

This month's cover

The Church of the Good Shepherd at Lake Tekapo, Mackenzie County, is the subject of this month's cover, reproduced from a colour photograph by Neuline Film Studios Ltd., Auckland. Situated on an eminence at the southern end of the lake, the church commands a 20-mile vista of lake and beyond that mountain scenery of great grandeur. The rugged beauty of the building, which is of local stone and the appointments of which are dedicated to pioneer sheep men of the Mackenzie Country, is of great interest to tourists, who come to enjoy the lake and alpine scenery, ice skating, and the long hours of sunshine, which, in addition to its game, are features of the district. A large hydro-electric development, in which the water resources of Lakes Tekapo and nearby Pukaki will be used, is at present well advanced.

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SUBSCRIPTION RATES

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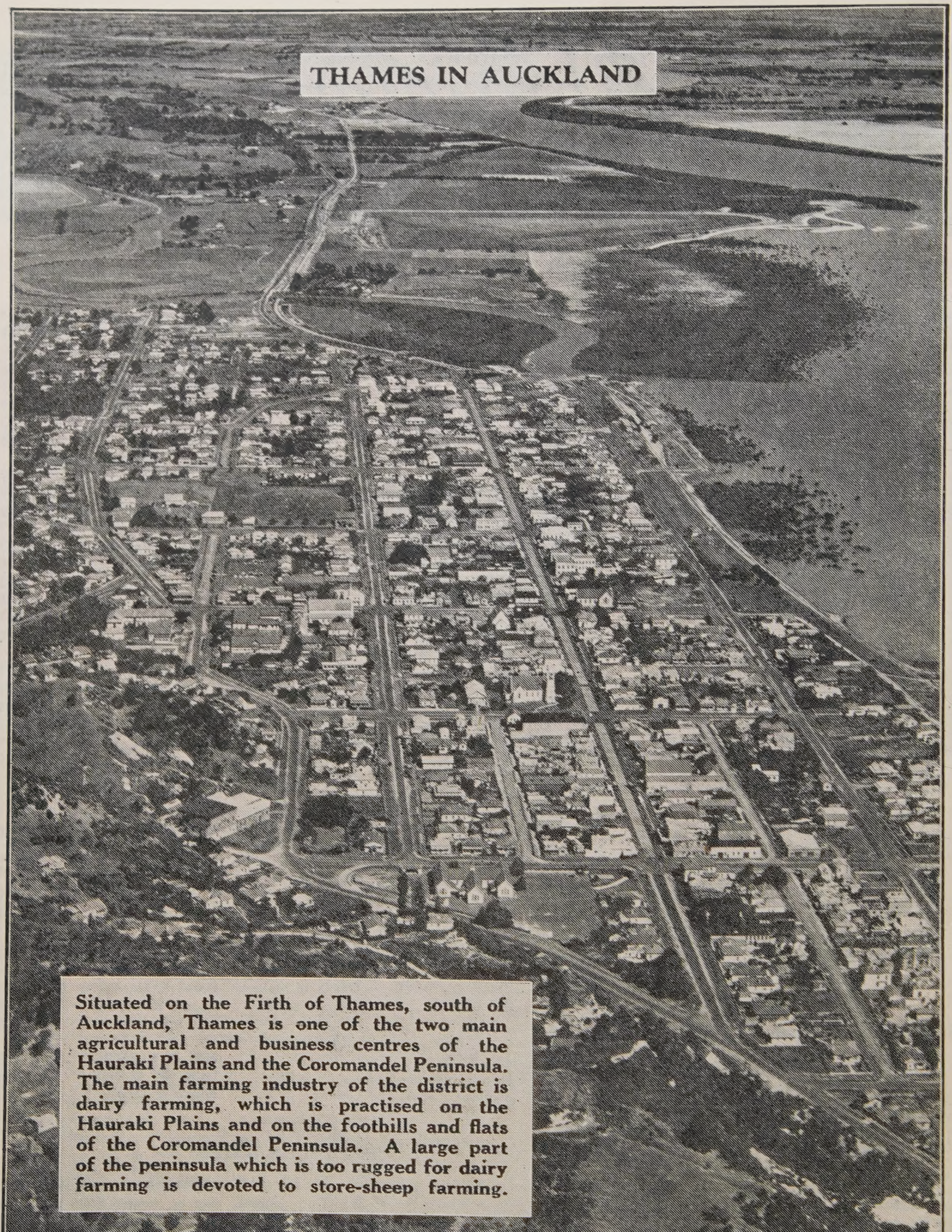
THAMES IN AUCKLAND



Situated on the Firth of Thames, south of Auckland, Thames is one of the two main agricultural and business centres of the Hauraki Plains and the Coromandel Peninsula. The main farming industry of the district is dairy farming, which is practised on the Hauraki Plains and on the foothills and flats of the Coromandel Peninsula. A large part of the peninsula which is too rugged for dairy farming is devoted to store-sheep farming.

[V. C. Browne photo.

YOUNG FARMERS' CLUBS AND AGRICULTURE'S FUTURE

THE excellent progress made by the Young Farmers' Club movement must be a source of satisfaction to all those genuinely concerned with the future of agriculture and the welfare of the Dominion. Though membership (9000) and the number of affiliations are higher than ever before—320 clubs today compared with 203 pre-war and 210 in 1946—there is still room for expansion, and I hope that within the near future the aim of 25,000 members and 800 clubs will be achieved.

Reason for Organisation's Importance

What is it that makes this organisation of young farmers such an important one in New Zealand? In the first instance agriculture is the basis of our economy and the farmer is one of our most important and valuable citizens. But despite the development of transport, radio, telephones, and communications generally, the farming community is cut off from many of the educational, social, and cultural activities enjoyed by city dwellers.

For young men brought up in a farming community there is a very distinct gap between the time they finish their formal education at schools and colleges and the time when they begin to play their part in the local and national organisations which cater mainly for the older farmers. The Young Farmers' Clubs were formed to fill this gap for young men between the ages of 14 and 30.

To Promote Knowledge of Agriculture

The main function of the organisation is to promote the knowledge of agriculture, to keep young farmers in touch with the latest scientific and technical developments, and to hand on to them the benefit of the widest and best experience of older farmers.

In the Y.F.C. young men are not taught only to be good farmers; they are taught to be good citizens and good leaders, or rather, through their organisation they themselves learn these qualities. The scope of Y.F.C. activities is extremely varied and ranges from lectures, demonstrations, and field days at the local club level to stock-judging contests and debates on a national basis. Social activities are an important feature of the movement and tours of other districts also assist in the training and development of our younger farmers. This year 18 district tours and periodical visits to industrial centres have been arranged.

Since the formation of the New Zealand Federation of Young Farmers' Clubs some 15 years ago much has been achieved and at least some of the credit should be given to those older farmers and their organisations who have had the vision to recognise the significance of the movement and who have acted in advisory capacities to the clubs.

Assistance from Department

The annual grant to the Federation has recently been raised from £500 to £1000; the Department of Agriculture provides the Dominion organiser and secretarial services of the movement, and Fields Instructors and other officers of the Department are at the disposal of the clubs for lectures, advice, and assistance.

The movement is non-political and non-sectarian. It is a genuinely-democratic organisation; the role of the Department is to guide the movement, not to control it, and members themselves make the decisions, elect their own officers, and formulate their own programmes.

I wish to extend my personal congratulations to the Y.F.C. federation on the inauguration of its memorial scheme to honour members who lost their lives in the Second World War. The proposal aims at the erection of additional buildings at the two agricultural colleges—Lincoln and Massey—and will provide facilities for special short courses for Y.F.C. members. Of a goal of £20,000, £15,000 has already been collected, and by the end of this year it is hoped that the remaining £5000 will have been subscribed.

Responsibilities for Next Generation

The future of the Dominion is inseparably linked with the future of New Zealand agriculture. Patterns and progress of farming will largely be determined by the attitudes and experience of the younger men. With the rapid advances in scientific agriculture, the next generation of farmers must be trained ready to shoulder the more complex responsibilities of the industry.

I sincerely hope that the progress made by the movement since the end of the war will continue and that the target of 25,000 members will be reached. I also hope that older farmers and the people of this country generally will give every encouragement to this splendid movement, because it is not only of value to the individual farmer and the farming community, but also to the whole of our national economy.

EDWARD CULLEN, Minister of Agriculture.

CARE OF LIVESTOCK DURING JULY

Contributed by the Animal Research Division.

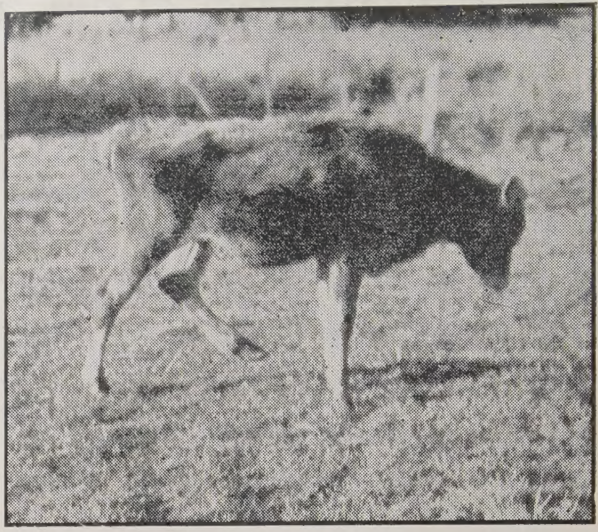
PULPY KIDNEY IN LAMBS

WHERE pulpy kidney occurs in lambs under 6 weeks of age its incidence can be reduced by vaccinating the ewes before lambing. If ewes have never been vaccinated before, the best results will be obtained from 2 doses of vaccine given at least a month apart. Ewes which were vaccinated last year will require only one vaccination. The last (or the only) vaccination should be given about a fortnight before lambing and this can be done quite safely if ewes are handled carefully. Very poor immunity results where the ewes are vaccinated much earlier than this. If most losses from pulpy kidney occur in lambs over 6 weeks of age, vaccination of ewes is of no value, but vaccination of lambs at marking time may help.

* * *

BLOOD POISONING IN EWES AND LAMBS

Losses from blood poisoning in lambing ewes and marked lambs appear to be increasing in some districts. These may be greatly reduced, if not eliminated, by vaccinating the ewes with blackleg vaccine about a fortnight before lambing. As the immunity which passes from the ewe to the lamb in the first milk does not persist for many weeks, lambs should be marked early. To obtain the best results it may be necessary to divide the ewes into early and late lambers, which should be vaccinated separately to ensure that all ewes are vaccinated from 10 to 20 days before lambing. Vaccine can be obtained from any office of the Department of Agriculture. Where possible ewes should lamb in clean spelled paddocks and lambs should always be marked in clean temporary yards.



ERGOTISM IN CATTLE

Hay made from ergotised grass will cause lameness and sometimes even loss of feet in cattle. The small black ergots which replace the seeds of ryegrass and other grasses can easily be seen, and if they are present in large numbers, the hay should not be used. Similar trouble often occurs when cattle are grazed on tall fescue grass even when no ergots are present. This grass should be regarded as poisonous and should not be grazed by cattle.

* * *

SLEEPY SICKNESS IN EWES

Heavy losses from sleepy sickness sometimes occur in ewes carrying twins or heavy single lambs. These losses may be prevented by ensuring that ewes do not suffer a check just before lambing. If necessary they should be divided into early and late lambers and drafted on to the best feed available 3 to 4 weeks before lambing. Research at Ruakura has shown that poor feed for 6 weeks before lambing can reduce the fleece weight by over ½lb.

* * *

WINTER FEEDING OF COWS

It is imperative that cows should be well fed for 6 to 8 weeks before calving. They should have access to hay at all times and if the pasture is poor, they should also receive up to 20lb. of silage per day. Early-calving cows should be given about 2 hours' grazing per day on autumn-saved pasture and in addition should be fed as much silage as they will eat.

Pasture Production in Canterbury

THOUGH Canterbury is the principal arable-cropping region of New Zealand, pastures are easily the most important crop and are the main source of feed of the Canterbury fat-stock industry. This article by the late R. P. Connell, formerly Fields Superintendent, Department of Agriculture, Christchurch, which was presented as a paper at the 1948 conference of the New Zealand Grassland Association, deals with the main aspects of the establishment, management, and utilisation of pastures in Canterbury and discusses developments and trends in pasture management in recent years.

IN Canterbury there are just over 8,000,000 acres of occupied land, the major part of which consists of:—

I. A grazing region of approximately 4,480,000 acres of tussock and other native grasses.

II. An arable region of approximately 2,720,000 acres, of which nowadays 600,000 to 700,000 acres annually are in arable crops and the remainder in pastures which are ploughed up at irregular intervals and used temporarily for the raising of annual crops.

From the above data it follows that the area of sown pastures annually is just a little over 2,000,000 acres.

I. The Grazing Belt

The grazing belt is devoted almost entirely to sheep farming, though some arable farming is done, mainly in the lower parts. It consists of steep hills and mountains, downs and river terraces, and of fairly extensive, fairly flat to undulating alluvial sediments which in some instances are spread out in considerable intermontane basins, for example, near Hanmer and Culverden in North Canterbury and the Mackenzie Plains in South Canterbury. It is the high country and foothills reaching westward to the main divide, the Southern Alps, together with the subsidiary ranges branching eastward therefrom. The vegetative cover is dominantly native grasses, in which native tussocks are often prominent, though in many places there occur English species of pasture palnts, among which browntop (*Agrostis tenuis*) and sweet vernal (*Anthoxanthum odoratum*) are common and cocksfoot (*Dactylis glomerata*), white clover (*Trifolium repens*), and perennial ryegrass (*Lolium perenne*) are fairly common.

II. The Arable Belt

The arable belt, where sown pastures and arable crops are grown, consists mainly of the Canterbury Plains, the adjoining rolling foothill country and downs, together with relatively gentle valleys of the various rivers such as the Waimakariri, Rakaia, Ashburton, and Rangitata, the direction of which is roughly westward from the plains. In addition, the arable belt includes the following important arable-cropping regions:—

(a) The roughly-triangular portion of North Canterbury lying between Waipara and Parnassus and extending inward to about Waiau, and (b) the coastal strip extending about 20 miles northward from the Waitaki River. In the arable belt there is a wide range of soils varying from light gravelly soils to heavy loams and including soils very rich in organic matter.

Sheep Population

In Canterbury, as in other provinces of New Zealand except Auckland and Taranaki, a major criterion of the welfare and productiveness of the grass-

HEADING PHOTOGRAPH: **A well-sheltered sheep farm in South Canterbury. The planting of shelter belts throughout Canterbury has played an important part in land development. Photograph by Department of Internal Affairs.**

land is the sheep population. In Canterbury in particular it is not so much the sheep numbers, but the sheep population (that is, both the classes and the numbers of sheep), which is important, for in Canterbury over the years there have been big changes in the classes of sheep as well as changes in the numbers. For example, in some places there has been a change-over, at times big, from Merinos to half-breds or Corriedales. In Amuri County, for instance, the percentage of Merino rams had changed from 18 in 1920 to 5 in 1945 and Corriedales from 13 in 1920 to 26 in 1945, and the general change in Canterbury is indicated by the fact that though the number of Merinos had fallen from 405,000 in 1926 to 338,000 in 1945, the number of half-breds had risen from 619,000 in 1926 to 1,134,000 in 1945.

There is no generally-accepted method of comparing the feed requirements of Merinos with those of half-breds; it is claimed by some that the feed requirements of 3 Merinos equal those of 2 half-breds, but others disagree with this ratio. It would seem that such a ratio in Canterbury is generally incorrect, though under some circumstances, as in parts of Mackenzie County, where half-breds usually are not kept, it may be virtually correct.

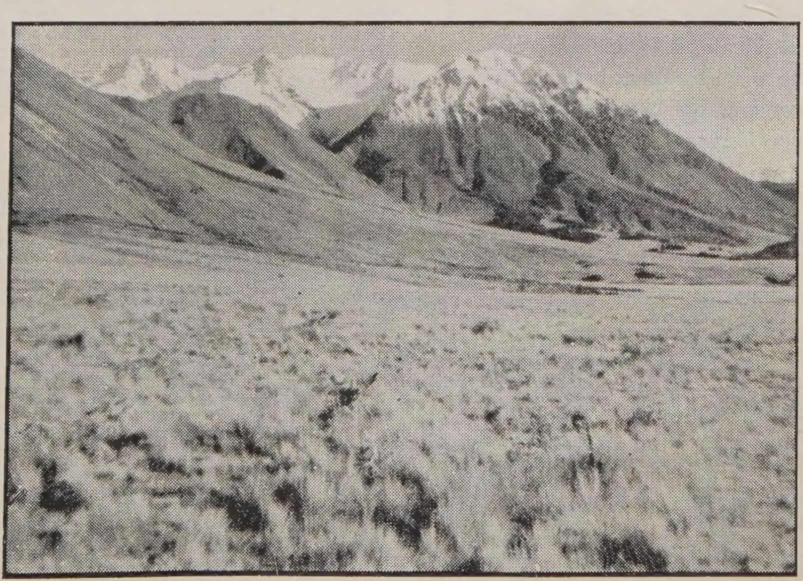
There have been other breed changes which are difficult to measure accurately. For instance, in Amuri 17 per cent. of English Leicester rams in 1920 had fallen to 6 per cent. in 1945, while less than 1 per cent. of Southdowns in 1920 had increased to 12 per cent. in 1945. Similarly in Cheviot 27 per cent. of English Leicester rams in 1920 had fallen to 3 per cent. in 1945 and 3 per cent. of Southdown rams in 1920 had risen to 15 per cent. in 1945. At the other end of Canterbury, in Waimate, 12 per cent. of Romney rams in 1920 had become 36 per cent. in 1945 and 1 per cent. of Southdown rams in 1920 had become 11 per cent. in 1945.

There has also been a change in the numbers of wethers. In Amuri wethers, which were 42 per cent. of breeding ewes in 1920, had become only 16 per cent. in 1945; in Waipara wethers, which were 15 per cent. of breeding ewes in 1920, were only 7 per cent. in 1945; in the central foothill counties (Ashley, Oxford, Selwyn, Tawera, and Malvern) wethers, which were 30 per cent. of breeding ewes in 1920, were only 12 per cent. in 1945, and in the Christchurch region (Waimairi, Heathcote, and Halswell Counties) wethers, which were 34 per cent. of breeding ewes in 1920, had fallen to 13 per cent. in 1945. At the southern end of the province, in Waimate County, wethers, which were 21 per cent. of breeding ewes in 1920, were 10 per cent. in 1945, and in Geraldine County wethers were 24 per cent. in 1920 and only 6 per cent. in 1945.

These figures show that it is difficult to assess how 1000 sheep carried in 1920 compare with 1000 sheep carried in 1945, but with the major changes being (a) from Merinos to half-breds or Corriedales and (b) a drop in the proportion of wethers, it is apparent that the requirements of 1000 sheep today are greater than those of 1000 sheep in 1920.

There have been changes in number of sheep carried in various localities. For instance, six North Canterbury high-country stations which carried 81,000 in 1920 carried only 52,000 in 1945, six high-country stations in the Waimakariri basin which carried 49,300 sheep in 1920 carried 45,000 sheep in 1945, and 11 Mackenzie County high-country stations which carried 58,000 sheep in 1920 carried 59,000 in 1945; 11 Mackenzie County extensive sheep farms which carried 27,000 sheep in 1920 carried 25,000 in 1945.

In general, decreases in numbers of sheep carried have been in the grazing belt, but they have not been at all uniform and in fact increases have taken place at times. However, the grazing belt today is carrying less sheep than it did, say, 20 to 30 years ago. In 1920 there were 4,727,822 sheep in Canterbury, whereas in 1945 this number had been increased to 5,588,778 sheep and from what already has been stated it follows that the additional 861,000 sheep are carried in the arable belt.



Tussock grassland in the upper Waimakariri basin, which is typical of much of the 4,500,000 acres of native grassland in Canterbury.

Sown Pastures

Canterbury continues to be the most important arable-cropping province of the Dominion. In 1945-46 it grew approximately two-fifths of all the arable crops of the Dominion; Otago and Southland each had only about a third of the acreage of Canterbury, and the whole of the North Island had an area much less than that of Canterbury.

Though arable cropping is relatively so important in Canterbury, even in the arable regions, where cropping takes place most generally, pastures are easily the most important crop. There are approximately 2,750,000 acres of arable ground in Canterbury, and on four-fifths of that ground each year there are pastures, which are the main source of feed of the Canterbury fat-stock industry.

The pastures of Canterbury are influenced fundamentally by the fact that arable cropping is relatively so important. The length of life, the composition, and the methods of utilisation are all affected by the important place that has been given to arable cropping in Canterbury farming, where pastures differ from those of the North Island, in which arable cropping is comparatively neglected.

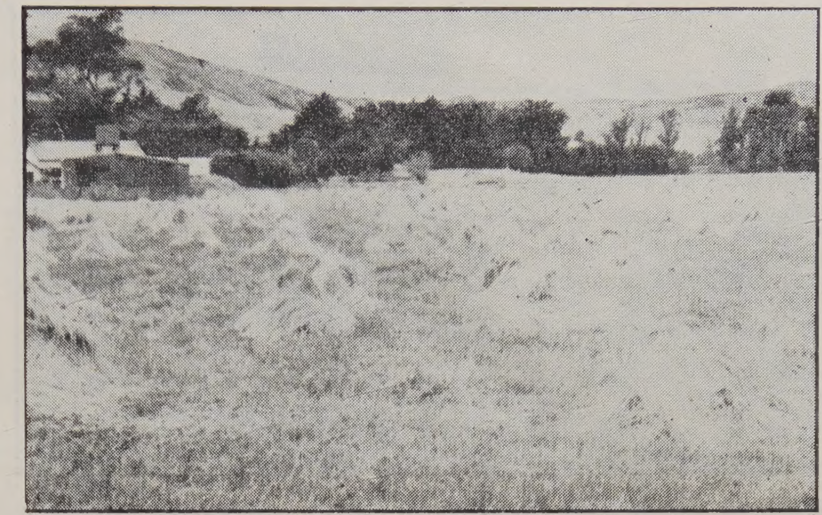
Length of Life

In many districts outside Canterbury most farmers seem to think that the longer pastures can be left without renewal the better it is, but in Canterbury's arable-farming area it is expected that pastures will be ploughed up after relatively few years. There are just over 2,000,000 acres of sown pastures in Canterbury and each year 200,000 to 250,000 acres are resown, so that on the average the life of sown pastures is 8 to 10 years, some lasting for a much shorter period and some for a substantially-longer period.

Though a fairly common age is 4 to 7 years, many pastures by design or accident have a much shorter life, but some sown pastures have a life of 12 years or more. For quite a long time the tendency has been to give Canterbury pastures a longer life. This is apparent from the acreage of crops grown and consideration of the fact that the smaller the acreage of arable crops the longer the pastures last in an arable-farming area. Cropping acreages have fluctuated greatly from year to year, but the general trend is given by the following figures:—

In the 3-year period ended	Average annual cropping acreage
1923	763,000
1933	699,000
1946	500,000

If this tendency continues much more, Canterbury will become largely a grass-farming area similar to the Hawke's Bay Plains and the Manawatu-Rangitikei district, in which cropping once was much more important than it



Short-rotation ryegrass is proving valuable in rich, well-drained country. Land in the Tai Tapu district, where this crop was grown, provides good conditions for this grass.

is at present. Because of climatic differences Canterbury is not so suited for grass farming, as mixed arable farming, which is practised in Canterbury today, is more productive than when there is more dependence on grass alone. The downward trend in the cropping acreage has in the recent period been more rapid than it was in the earlier period.

Composition of Pastures

In Canterbury there is more dependence on the ryegrass-clover mixture than in most other districts. This is due partly to the length of life of many of the pastures and partly to the extent to which seed production is a regular feature of the farm production. However, other species than ryegrass and clovers are fairly extensively used. Probably the main departure from the ryegrass-clover mixture is the use of cocksfoot on light plains country in substantial amounts.

There is also a fairly extensive and growing use of subterranean clover on land so inferior that white clover does poorly if it establishes at all. Subterranean clover has been grown in Canterbury for at least 30 to 40 years, but only relatively recently has it become of importance. This is because not until fairly recently has it been realised that success with subterranean clover calls for special management, which consists mainly of giving it a chance to reseed in the early stages and of dressing it with phosphatic manure.

There are approximately 750,000 acres of light, shingly land in Canterbury, worth today £9 per acre or less, and much of this is known as light plains country. There are still limitations to the knowledge of the place and manner of using subterranean clover, but already enough is known about it to indicate that the productive capacity of much, if not all, of these 750,000 acres can be increased, at times substantially, in an economic manner by the suitable use of subterranean clover. In fact, in many instances the use of subterranean clover, in conjunction with the use of phosphatic fertiliser, will enable the carrying capacity of sheep to be doubled or more than doubled in a few years.

In general subterranean clover is of use, particularly on land which as it is at present is not good enough consistently to grow white clover well; occasionally on land somewhat better it may be advantageous to use subterranean clover, especially when such land suffers from dry summers.

Timothy is frequently sown in damp situations, especially where dairy farming is practised, and there is a widespread use of crested dogstail; there is restricted use of *Phalaris* and alsike, and prairie grass and Yorkshire fog are not at all unknown.

Seed Mixtures

The most important modern development in Canterbury pastures is that inferior strains of pasture plants, formerly in very common use, are today seldom used. Very much of the seed used is Certified seed and most of the remainder is closely related to Certified seed; more than a third of the acreages sown annually is either used for the production of Certified seed or could be so used. Seed may be sown either for grazing and seed production or for grazing alone. Much of the seed sown today is designed for grazing and seed production.

There is a great diversity of ideas even among good farmers as to what constitutes a good seed mixture if seed production is involved. For instance, in a recent examination of 500 seed mixtures used in recent years, it was found that though about 30lb. of ryegrass was the amount most commonly used, amounts of about 20lb. and of 40lb. were also fairly commonly used. To illustrate further the diversity in practice, in the same district one farmer used 48lb. of ryegrass while another used 16lb. of ryegrass, both for autumn sowing. In all these cases perennial ryegrass of high germinating capacity was used. Some details of the constituents of seed mixtures in common use will be given in a later article by C. C. Leitch, Assistant Fields Superintendent, Department of Agriculture, Christchurch.

Time and Method of Sowing

Sowing is carried out both in spring and in late summer and early autumn. Nowadays autumn sowing is regarded as likely to give good results, though possibly it is not more popular than the spring sowing.

Latterly 120,000 to 140,000 acres of pastures, about half the total sown annually, are sown with companion crops such as cereals, rape, and turnips. Normally autumn sowing without a companion crop should give the best results. Many cling to the idea that the companion crop provides shelter, which undoubtedly is true, but it is not difficult to provide too much shelter for the fullest immediate development of the pasture.

Liming

The trend in liming in recent years is shown by the following figures:—

Season	Tonnage of lime delivered at Canterbury stations
1934-35	16,598
1941-42	63,935
1944-45	109,335

These figures show the trend but not the full Canterbury programme of liming, since an appreciable quantity of lime used has not been carried by rail. The area limed is shown in returns as 172,495 acres in 1944-45. This means only 1 acre in 15 on the arable belt alone. Hence, only a small portion of the land that could be limed with resultant benefit to crops is actually being limed, but the demand for lime at present is so great that often there is much delay in its delivery.

Canterbury is well supplied with deposits of lime suitable for agricultural purposes and the maturing of plans already made will make substantially greater quantities available. Both field experience and official trials have indicated substantial benefit from liming on mixed Canterbury land.

Phosphatic Topdressing

Apart from a few minor cases, phosphatic topdressing only has been found of major importance in Canterbury. About 20 years ago a number of trials each of two kinds were carried out carefully. In the first kind there was pasture that had been established at least a few years and that was sometimes worn out or deteriorated. In the second a new pasture was used.

In the first type of trial there was little if any benefit over a period from the phosphatic manure and as a result it was felt that phosphatic topdressing of pastures was not worth while in Canterbury, notwithstanding that good results might be obtained in other districts of New Zealand. It seems now that the poor results from pastures established for some time may have been partly due to the poor type of perennial ryegrass that was then prevalent, mainly to the poor type of white clover that was often present (the stubble white type), and perhaps partly also to the weather in combination with these two other factors.

The second type of topdressing trial on freshly-established pastures contain-

PASTURE PRODUCTION IN CANTERBURY

Red clover has been grown very extensively for both seed and fodder, particularly on the rolling country of South Canterbury.

ing good species and usually including ryegrass and clover in plenty gave quite good results when Certified seed or its near equivalent was used, but often when the pasture seed was of indifferent type the results of the phosphatic fertiliser could not be considered enduring enough to be assessed as worth while.

Over a number of recent years many official trials and much observation of results on a field scale have presented widespread evidence of benefit from the use of phosphatic fertilisers on suitable pastures.

Increase in Acreage Topdressed

For a dozen years or so before the war phosphatic fertilisers had been growing in popular use for the topdressing of grassland, as the following data indicate:—

Year	Area topdressed in Canterbury with artificial fertilisers Acres
1927-28	45,511
1937-38	158,274
1940-41	170,722

The year 1940-41 is the peak one in annual acreage topdressed, which, of course, decreased under rationing.

As yet topdressing with artificial fertilisers has had a very minor place in Canterbury grass farming. Probably the most significant feature is the steady increase, particularly in recent years, in the acreage topdressed. In the 1940-41 season 246 acres were topdressed with fertiliser for every 100 acres topdressed 5 years earlier. It is reasonable to assume that this increase has been based largely on favourable experience; probably to a considerable extent the earlier topdressing was a trial or of a tentative nature and because of the good results observed farmers have persevered with it, and, indeed, extended their topdressing programme.

Even in the peak year the amount of topdressing done in Canterbury was meagre in comparison with what is customary in some other districts in New Zealand. One of the factors contributing to this is that until relatively recently much of the pasture work on arable ground militated against good results from artificial fertilisers. The use of inferior strains of pasture species, for example, inferior ryegrass, most of which was perennial in name only, gave swards of such a short life of reasonably good production that artificial fertiliser used on such swards was less effective than it would be on the better swards which now can be produced reliably by the use of superior Certified strains.

A second factor that militated against success with topdressing was the application of artificial fertiliser to old pastures so deteriorated that inferior species such as browntop were prominent constituents or some ground was bare. Experience has shown that as a rule in Canterbury topdressing of land carrying such swards is inadvisable, whereas if the old, inferior sward is ploughed down and replaced by the better and more vigorous one which suitable strains and species of seed will give, topdressing may be well warranted.

A third factor militating against the fullest success from topdressing pastures with phosphates has been the failure, which still fairly frequently obtains, to reinforce the phosphatic fertiliser topdressing by carrying out liming also. Farmers who fail to make joint use of lime and phosphates overlook the fact that a limiting factor in the response from phosphates may be a deficiency of lime, which is characteristic of much Canterbury land. The expansion of topdressing in Canterbury is retarded also by the rainfall not being sufficient to allow of results being as spectacular as they are in some of the heavier-rainfall districts. This is a circumstance which cannot be overcome in most of Canterbury, except in those districts in which irrigation is undertaken.

Though phosphatic topdressing, because of climatic conditions, does not promise to assume a role as great as it does in certain other major farming districts, the results from it will be improved by linking it with good swards and with liming; in any case there promises to be a substantial increase in Canterbury's programme of phosphatic topdressing and there is evidence that this increase will be justified.

Utilisation of Pastures

The utilisation of pastures is more complicated in Canterbury than it is in most other districts, because it involves not only the use of the grazing animal, together with haymaking or silage-making, as a means of converting surplus summer growth, but also extensive seed production as a means of utilising surplus summer growth and extensive supplementary crop growing to tide over periods during which direct feed from pastures is in short supply.

Rotational grazing has not been exploited in Canterbury as much as in some North Island districts, but a few farmers have obtained distinct success with it in Canterbury, and probably in the future more attention will be given to it.

Canterbury farmers give much attention to the saving of summer surplus growth; in 1945-46, the latest year for which there are figures, 1 out of every 12 acres of sown pasture was utilised for hay, silage, or seed. The only other districts in New Zealand which approach the above ratio are Taranaki, where the ratio was 1 to 13, and Auckland, where the ratio was 1 to 16.

There is practically no silage in Canterbury and considering the weather conditions there can be little or no complaint regarding this neglect; usually the weather is good or reasonably good for haymaking.

Increasing attention has been given in Canterbury to the hay crop, as shown by the following table:—

3-year period beginning	Hay acreage
1920	19,000
1930	25,000
1943	44,000

The increase in the hay-crop acreage has been more rapid latterly. It seems reasonable to expect that the wider use of labour-saving machinery such as the pick-up baler will bring about further expansion of haymaking, which would have a favourable influence upon the winter feeding of livestock.

Pasture-seed Production

Seed production as a means of adjusting growth surplus to the current requirements of livestock has for decades been a feature of Canterbury farming. Originally seed production was accidental in that it took place if the stock did not need the feed, and the acreage devoted to seed production varied sharply from year to year according to the weather experienced in a particular year, especially during late spring and early summer. For instance, in 1924-25 the area devoted to seed production was 56,000 acres, in 1927-28 it was 27,000 acres, in 1930-31 39,000 acres, in 1931-32 24,000 acres, and in 1932-33 68,000 acres.

The area devoted to seed production is still dependent on the weather and to a less extent on the price offered for the seed, but it is much less an accident than it used to be. Nowadays an area is often sown with seed production in view; special, expensive machinery is available for the work, and seed production will be carried out as a routine farm practice if at all possible.

One result is that in the 4 years beginning 1940-41 the area devoted to seed production ranged only from 73,000 acres to 78,000 acres. In other words seed production from being a spasmodic or sporadic feature has become a regular and routine practice on many farms. From a marketing viewpoint this is desirable, as customers can depend on more regular supplies.

A feature of pasture-seed production has been the rapid expansion in the production of Certified seed during recent years. The acreages devoted to the production of seed of the better grasses and clovers during the past 6 years present some interesting features. The acreages relative to ryegrasses, cocksfoot, red clover, and white clover are set out in the table at right.

ACREAGES DEVOTED TO SEED PRODUCTION AND AREAS ENTERED FOR CERTIFICATION

	1940-41		1942-43		1944-45		1946-47 *	
	Total acreage harvested for seed	Entered for certification	Total acreage harvested for seed	Entered for certification	Total acreage harvested for seed	Entered for certification	Total acreage harvested for seed	Entered for certification
Perennial ryegrass ..	36,346	3,590	23,410	8,319	28,409	16,561	42,236	38,275
Cocksfoot	8,175	6,174	6,733	5,262	8,179	6,341	5,689	4,466
Italian ryegrass ..	13,186	3,885	8,021	3,470	15,537	11,018	18,058	13,140
White clover ..	8,036	219	15,650	475	14,042	3,261	34,068	25,027
Red clover	7,413	3,425	18,853	10,541	20,871	19,282	24,197	20,366
Totals	73,156	17,293	72,667	28,067	87,038	56,463	124,248	101,274

* 1946-47 certified acreages for perennial ryegrass and white clover include permanent pasture seed.

In 1947 the area entered for certification dropped to 91,586 acres. This drop seems to be both insignificant and temporary and there is promise of further expansion.

The changes during recent years have been both an increase in seed production and a change-over from the production of seed of indifferent or indeterminate strain to the production of seed of a known good strain.

Yields of Pasture Seed

For the 6-year period 1939 to 1945 the average yields of seed per acre in Canterbury were shown in returns as follows:—

Perennial ryegrass	14 bushels
Red clover	118.4lb.
White clover	117.6lb.

It seems probable, and there is some evidence to support the view, that the yields of Certified seed are less than the above figures, which relate to uncertified as well as to Certified seed; because of the better price for Certified seed, crops poorer than those from uncertified seed might well be harvested.

It is known that yields substantially higher than average are far from uncommon and it follows that ones substantially lower must also be obtained quite often. Such lower yields require consideration. Some, but by no means all, may be due to unfavourable weather, some are due to saving seed from deteriorated pastures, and some low yields of clover may quite well be due to inadequate fertilisation because the number of suitable insects to effect pollination is insufficient.

Whether the causes are cultural, economic, or both, the matter of yields well below the average needs consideration.

Seed Growing on Mixed Arable Farms

When a man allows his seed-growing projects to dominate what is done on the farm he is for practical purposes a seed grower rather than a mixed arable farmer. In this sense there are very few if any seed growers in Canterbury, apart from those belonging to the recognised seed trade.

A large body of mixed arable farmers undertake seed growing as part of their activities. This is considered by some to have disadvantages, as farmers who specialise in seed growing might well be expected to be better in technique than those who do not specialise. There might probably follow some improvement if there were specialisation in seed growing. But though here and there technique is inefficient, in general the mixed arable farmer carries out at least reasonably well the seed growing he undertakes, and in general the system of having such mixed arable farmers rather than specialised seed growers grow pasture seed seems to be in the national interest. The pasture-seed growing benefits by being integrated with arable farming in that often the cost of machinery used for seed grow-

In recent years seed production has become a regular practice on many Canterbury farms, and the area saved for small seeds has increased considerably.

[*V. C. Browne photo.*

The Waipara district is typical of North Canterbury farmland, most of which consists of low to medium-height rolling hills interspersed with river basins which are well suited to arable farming.

ing is spread to other farm projects; in arable cropping there can be cashing of the accumulated fertility due to certain types of pasture-seed production and generally arable cropping and pasture-seed production readily and suitably go hand in hand. Today tractors and header harvesters would not be as common in Canterbury if the arable farmer did not grow Certified seeds as well as grain crops.

Supplementary Cropping

Pasture utilisation is assisted in Canterbury to a substantial but decreasing extent by arable cropping. In the 3-year period ended 1925 an average annual area of green crops such as turnips, rape, and mangolds of 313,000 acres was grown, whereas in the 3-year period ended 1945 the average annual area had fallen to 230,000 acres. In addition, green cereals, the acreage of which has also fallen, are used.

These crops serve valuably in getting the stock through periods when the feed available directly from pastures is relatively small. They are part and parcel of the system of farming in vogue in the arable country of Canterbury; it is difficult, perhaps impossible, to ascertain accurately what they cost or are worth. It is accepted, however, that these crops are well worth while. The fact that there is a smaller acreage of supplementary crops than was grown about 20 years ago may be taken as due to an improvement in pastures, but it does not at all follow that any improvement in pastures should be associated in the reduction in the acreage of supplementary crops; rather, improvement in Canterbury's pasture might well mean improvement in numbers of stock with maintenance of supplementary crops.

Effect of Seed Growing on General Farm Production

It has been said that the production of Certified seed has led to neglect of other forms of production such as wheat growing and fat-stock production. The allegation in respect of wheat growing seems to have been true.

There is little doubt that one of the main causes of the relatively low yield of grass and clover seed in Canterbury is that the seed has been saved from paddocks which are beyond their prime because of their old age. Though often these paddocks would not have been ploughed up even if they were not used for seed production, at times the fact that a small crop of Certified seed could be obtained may have influenced the owner in deciding not to plough up a paddock. Such an operator is not doing the maximum either as an arable farmer or as a seed grower. His alternative course has been and is to plough more frequently, to grow more cash crops such as wheat where the fertility is accumulated, and to get subsequent yields of Certified pasture seed from more vigorous pastures.

Meat production may ultimately be affected in that there might come a day when all pastures are so good that to divert any of them to seed production would automatically bring about a reduction in livestock-carrying capacity and even then the seed production might well be warranted in view of the cash returns.

Effect of Seed Growing on Meat Production

A charge has been made that the production of Certified seed has been developed in Canterbury to an extent that it has led to a falling off in the production of fat stock.

Undoubtedly on a farm on which all the pastures are really good such a result may be obtained, but the farms on which a falling off in livestock production has already been obtained are few if any.

What has been taking place on farms which have been increasing their seed-growing activities over a number of years has been examined, with the following results:—

Initially the only fact known about the selected farms was that according to official seed certification records they had increased their seed-production activities over a number of years. The period covered by the investigation was 1941-42 to 1944-45 inclusive. Twenty-four farms evenly distributed throughout Canterbury and totalling 9244 acres were considered.

In the first season 733 acres were devoted to seed production, which had grown to 1848 acres in the final season, the various crops grown being perennial ryegrass, Italian ryegrass, Montgomery red clover, cowgrass, and white

The use of high-producing and permanent strains of both white and subterranean clover has been a major factor in pasture improvement.

[*National Publicity Studios photo.*

The Canterbury Plains, extending from Amberley to Timaru, form the greater part of the plains land of about 2,750,000 acres, where arable farming is practised. Improved pasture production in this arable region has resulted from the use of better seeds, lime, and fertiliser.

clover. The numbers of sheep carried were:—

	Season 1941-42	Season 1944-45
Ewes	9,633	10,672
Total sheep	11,544	13,651

Other changes were:—

1. In the beginning 42 per cent. of the farms were in good grass, compared with 48 per cent. in the latter period.

2. Cereal crops declined while peas and potatoes increased, these changes being very similar on the selected farms and on Canterbury farms as a whole.

3. There was a sharp decline in the area in rape on the selected farms; otherwise the trend on the selected farms shows very little change from that on Canterbury farms in general.

Soil Erosion

In 1938 a committee of inquiry consisting of officers of the Department of Scientific and Industrial Research, the Department of Agriculture, the State Forest Service, Canterbury Agricultural College, and Victoria University College reported upon land erosion in New Zealand. This committee divided Canterbury into three regions and described them in the Department of Scientific and Industrial Research's Bulletin No. 77 as follows:—

1. **The mountainous country**, composed largely of greywacke. Erosion: Wind-sheet and gully erosion accompanying deterioration of tussock; shingle slides and gullies developing where beech forest has been destroyed.

2. **The plains and adjoining foothill downs.** Erosion: Largely controlled; some wind erosion.

3. **Downs of greywacke sandstone, mudstone, limestone, etc.** These lie between the first and second regions and mainly are not arable. Erosion: Some sheet erosion.

Apart from the mountainous region, it would seem from the foregoing that erosion had not become serious in Canterbury 9 years ago and that in the meantime the position has improved rather than deteriorated. This is because grassland farming, especially on the arable areas, was improved. Pastures have longer life and there is less cropping than there was about 15 years or more ago.

At times statements are made about soil conservation in Canterbury or allied subjects such as deterioration of vegetative cover that do not seem to take into account all practical considerations, and such statements must be discounted accordingly. For instance, it has been stated that a certain area in the upper Waimakariri basin today carries 44,000 sheep and years ago carried 66,000 sheep, the implication being that the degree of deterioration is to be measured by these two sets of figures indicative of carrying capacity. The figures are true, but the implication probably is not. First, the sheep, which nowadays are largely half-breds, in the earlier days were largely Merinos and this forbids a straight-out comparison on the basis of figures alone. Secondly, there is no certainty that the region was ever capable of carrying 66,000 sheep. Indeed it is certainly possible and perhaps probable that when the area was carrying 66,000 sheep it was overstocked and that damage was done by this overstocking.

Again, it has been suggested that some special treatment such as strip cropping, terracing, or contour furrowing of Canterbury's downlands has become or will become advisable. It is well to remember that erosion of downlands today is generally much less than it was once, that at times today instead of erosion taking place soil fertility is being built up, and that as yet there is little or no knowledge of the economics of the new practices which are mentioned. In addition, there is a tendency to overlook the fact that under certain circumstances in Canterbury erosion is natural rather than induced by man and his animals.

To sum up, in Canterbury there is erosion that requires attention and study, but its real effect has at times been exaggerated and much of the induced erosion fortunately can be remedied best, not by special treatment, but by good farming. Today there are also guardians against undue erosion which did not exist until relatively recently. In Canterbury there are two catchment boards and a Soil Conservation Service specially designed to combat undue erosion. The biggest factor in the avoidance of erosion is the agencies that bring about better farming such as the Grasslands Division of the Department of Scientific and Industrial Research and the Department of Agriculture.

General Position

Somewhat briefly the general position in respect of Canterbury grassland is:—

First, there are 3,500,000 acres of native grasses. At times this has deteriorated only slightly if at all, but in general there has been visible deterioration due to the advent of the European. This deterioration at times is substantial, but usually is not as striking as some suggest.

It is virtually certain that substantial improvement of deteriorated native pastures is possible, particularly of the better ones, which often are favoured by at least reasonably good rainfall, though often what at first may seem favourable rainfall is offset by the prevalence of drying winds.

Factors of promise in the improvement of native pastures are:—

1. The systematic surface sowing of useful pasture species, especially subterranean clover and white clover.

2. Topdressing with phosphates, especially of the better pastures where the rainfall and conditions generally are favourable.

3. Better grazing management, particularly the avoidance of periodical over-grazing, which occasionally has been due to rabbits.

4. Suitable action in respect of burning.

Secondly, there are slightly over 2,000,000 acres of sown pastures, and during the past 25 years there has been marked improvement in these. About 1,000,000 additional sheep are being carried today in comparison with 25 years ago. This is being achieved with a reduced area of fodder crops grown especially to assist the pastures. In addition, 1000 of the sheep carried today have greater feed requirements than those carried earlier in that today half-breds are used in place of Merinos and breeding ewes instead of dry ewes and wethers. Further improvement of the sown pastures is clearly possible and the measures which will bring about such improvement are already being practised, the main ones being:—

1. The greater use of the superior strains of pasture plants.

2. More topdressing.

3. More liming.

4. Wider use of subterranean clover on light country.

As other districts have carrying capacities of 5 ewes, 6 ewes, and occasionally even more than 6 ewes per acre on grass alone all the year round, it is taken without question that on the score of carrying capacity only the Canterbury farmer is not at all in the forefront. But if consideration is given to the criteria of good grass farming that have been laid down by such authorities as E. Bruce Levy and Sir George Stapleton, and these criteria are accepted, as they usually are, it is necessary to take into account among other things how the farmers keep their pastures young, for they must be young in nature if not in age. It would also be necessary to take into account how the farmers manage during periods of high and of low growth and how they use up any building up of fertility that may accrue and of how they face the strong and weak points of their climate. If these various phases of farming are taken into account, the good mixed arable farmer in Canterbury ranks high in New Zealand. He at least is a good user of grass both from the individual and the national viewpoint and his returns in terms of capital value of his land are indeed excellent.

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Gorse Crushed by Traction Engine Wheel

GORSE hedges are widely used in Canterbury and it is not uncommon for some farmers to have 12 or 15 miles of these hedges to keep under control. Until about 10 years ago the only way in which the gorse could be controlled was to cut the hedges periodically with a gorse knife or slasher, a very laborious job, but in recent years mechanical gorse cutters have largely replaced the gorse knife and general opinion is that gorse hedges are now neater and better maintained than they were in the past. Nevertheless gorse still seems to spread from fence lines by seeding, and with labour not always available to eradicate it by grubbing, some method of keeping the gorse in check until it can be grubbed is necessary.

Some farmers make a practice of running iron-wheeled tractors over their spreading gorse, partially controlling it with a bruising and skinning effect. A much more effective method is used by several farmers in the Ashburton County who control their gorse by dragging a traction engine wheel over it. This operation may be carried out at any time of the year, but best results are obtained when the ground is hard, as in February. Where the gorse is not uprooted the bruising and skinning which occur either kill the plant or give it a severe check. The wheel, weighing about 1 ton, can be hauled with any 4-furrow farm tractor.

This method may be used with success on well-established stands of gorse up to 3 or 4ft. high.

—R. M. COMER,

Assistant Fields Instructor, Department of Agriculture, Ashburton.

N.Z. Grassland Association Annual Conference

THE New Zealand Grassland Association, a body formed in 1931, which is composed of farmers and scientists interested in pasture development and its problems, will open its annual conference at Rotorua on November 21. The meeting is open to the public and local farmers particularly are welcome. The association has held meetings in various parts of New Zealand and the conference is being held in Rotorua this year because of the great scope for development in the surrounding vast areas of pumice lands.

The opening address will be given by the president of the association, Mr. F. R. Callaghan, secretary of the Department of Scientific and Industrial Research, and the annual meeting will follow. During the next three days papers of scientific interest will be read and discussed. Foremost on the agenda are papers dealing with the soils and development of pumice lands (and the respective claims of forest and pasture on such country) and development of pasture species, including their establishment and treatment. Excursions will be made to inspect pumice land in different stages of development for pasture, and forestry projects and plantations.

Those wishing to attend the meeting at Rotorua are invited to write to the secretary of the New Zealand Grassland Association, c/o Department of Agriculture, Box 3004, Wellington, for further particulars.

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CORRECTION TO PLANT NAMES

A transposition in part of a column in a table on page 358 of the April issue of the "Journal" caused the common English names of four plants to appear opposite the wrong Maori and scientific equivalents. The corrected portion of the table is:—

Maori name	Scientific name	English name
Poroporo	*Solanum aviculare*	bullibull
Putaputaweta	*Carpodetus serratus*	
Rangiora	*Brachyglottis repanda*	white back
Rata	*Metrosideros robusta*	northern rata
Tataramoa	*Rubus australis*	lawyer

Mistakes also occurred in the spelling of the scientific names for papaumu (*Griselinia littoralis*) and houhere (*Hoheria sexstylosa*).

◆

FARM DAIRY INSTRUCTION

The Milking Process, Cooling of Milk, and Separation of Cream

By W. G. BATT, Supervisor of Farm Dairy Instruction, Department of Agriculture, Hamilton.

MILKING is an aspect of dairying in New Zealand which must be considered under two headings, hand milking and machine milking, and reference to treatment of milk must include treatment and care of cream before delivery to the manufacturing dairy, because most New Zealand butter is produced from home-separated cream.

THE dairying industry in New Zealand started with the manufacture of butter and cheese in the more suitable and more compactly-settled districts and with the delivery of whole milk to the manufacturing dairy. The introduction of refrigeration in the transport of perishable produce throughout the world, combined with a climate eminently suiting New Zealand to dairying, brought a rapid increase in the industry in the scattered and more remote districts, an increase which could not be handled by the delivery of whole milk to dairies owing to time and transport factors.

In 1908 the system of home separation was introduced and rapidly extended throughout the Dominion. It provided for the milk to be separated on the farm and the cream to be delivered to the manufacturing dairy. This system had many advantages in a country under development, particularly in regard to transport, as the greatly-reduced bulk of the cream to be carried in contrast with that of whole milk enabled the production from farms in areas up to 50 miles from the manufacturing dairy to be conveniently transported in the time available.

By reducing the labour and transport factors very considerably, and by providing a means whereby the most distant and remote farmer could have his raw produce delivered to the manufacturing dairy, the home separation system was an immediate success, and it can be regarded as the greatest single factor in the rapid extension and development of dairying in New Zealand.

It has since become firmly established, with butter factories of an output of up to 6000 tons per annum collecting cream daily from farms within a radius of 50 miles. While the system facilitated the extension of dairying itself, it also necessitated consideration and attention to the care and treatment of cream on the farm before delivery to the dairy.

Milking and Machine Milking

The milking cow population of New Zealand totals about 1,700,000, and of this number approximately 91 per cent. are milked by machinery. Hand milking therefore plays only a small part in the industry and is largely confined to the milking of small herds of cows on small farms surrounding the cities. The application of machinery to milking ranges from the one-cow plants milking herds of 10 to 12 cows to the 6- or 8-cow plants milking herds of up to 200 cows. In the more fertile dairying districts the majority of herds may be from 100 to 150 cows milked by milking machines of six separate sets of teat-cups.

Fundamentally the milking process both by hand and machine should have the objective of removing the milk from the cow as quickly as possible, both as an aid to fuller production and to induce a fast milk flow. There is abundant evidence to show that slow and irregular

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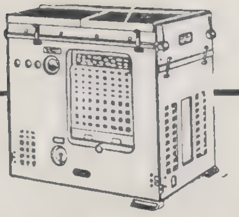
Heading photograph by National Publicity Studios.



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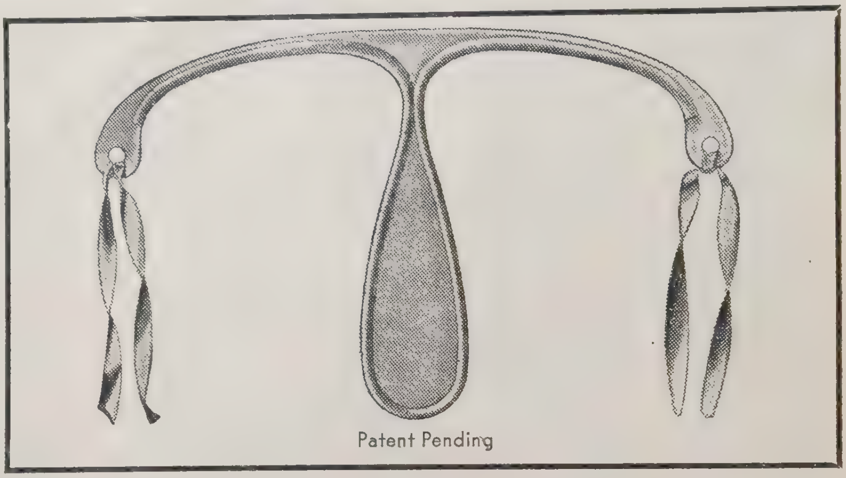

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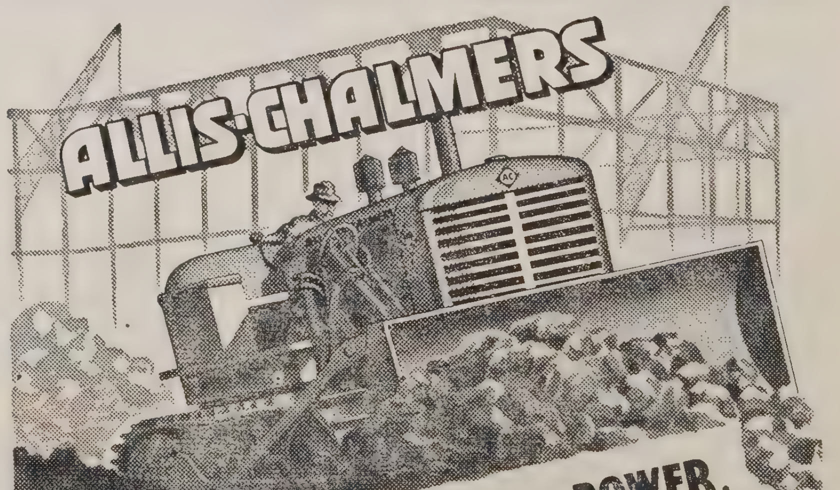

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methods of hand milking or the inefficiency of a milking machine will tend to induce a slower and more or less irregular milk flow, which results in whole herds of cows forming a tendency to "stripping," which is costly in time and production. Similarly, anything such as fright, noise, or abuse likely to affect the let-down of milk should be avoided. The release into the bloodstream of the hormone which causes the immediate and continuous fast flow of milk from the udder can be just as easily checked by unusual actions on the part of the operator, by abuse, or by fright. Consequently quiet and regular habits should be observed together with a constant routine to which the cow will become accustomed.

The stimulus which will cause the release of the hormone will be commenced by the routine of preparation for milking, and will be fully provided by a complete washing of the teats and udder, which has the double effect of cleanliness and stimulation. It is important that the provision of this stimulus should be regulated by strict routine with the object of forming a habit which, by its regularity, will condition the cow to the necessary stimulation. The contentment of the cow is the most important aspect, and this is best provided by the tranquillity of a quiet and strict routine.

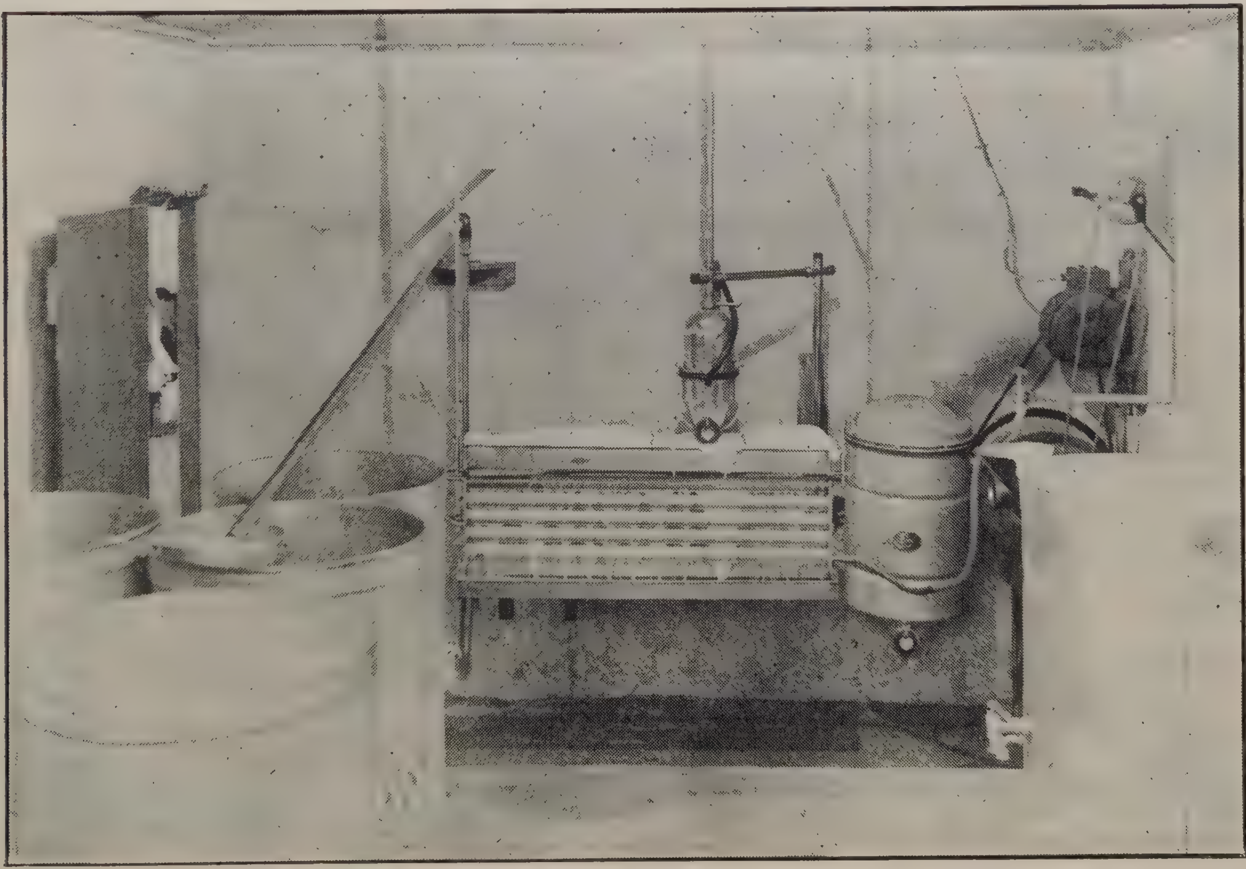
If these conditions in the shed are regularly observed, the conditioning of the cow and the release of the hormone causing the let-down of the milk will occupy about a minute, and it is important that milking should begin at this stage, as otherwise part of the hormone is destroyed, and milking is incomplete. From this stage the whole milking should be as rapid as possible, and the efficiency of the milking machine on this point is important.

An inefficient milking machine will be slow in its milking action chiefly because of unsatisfactory vacuum and pulsation induced by unsatisfactory joints causing air leaks and by an inefficient vacuum pump or one of insufficient capacity. If slow milking is persisted in for several years, it will cause a progressively-slower milk flow over the whole herd, because cows become conditioned to the habit, and for this reason, and to induce a full and rapid milk flow, fast milking is important.

As the objective of machine milking is to remove the milk from the cow as quickly as possible, the machine must be efficient, particularly in its vacuum and its pulsation. A vacuum of from 14in. to 15in. has proved most satisfactory, and the pulsators must be properly ground, tight, and correctly set at the desired ratio. As a quick discharge of air is essential, the vacuum pump must be efficient and of sufficient capacity for the size of machine. The piping used on the vacuum system must be reasonably straight to facilitate the discharge of air, and the fittings and pipes in the milk section must be of sufficient size to facilitate the discharge of milk. Connecting unions must be in good condition and air leaks eliminated. As any fitting or part on the machine which will tend to retard the quick flow of air or milk will reduce efficiency and will induce slow milking, a milking machine simple in construction is desirable.

The cleaning and sterilisation of a milking machine are also facilitated by a compact and simple construction. Extra devices of doubtful value to the milking process merely add to the labour of cleaning and make effective sterilisation difficult by providing additional places which harbour bacteria.

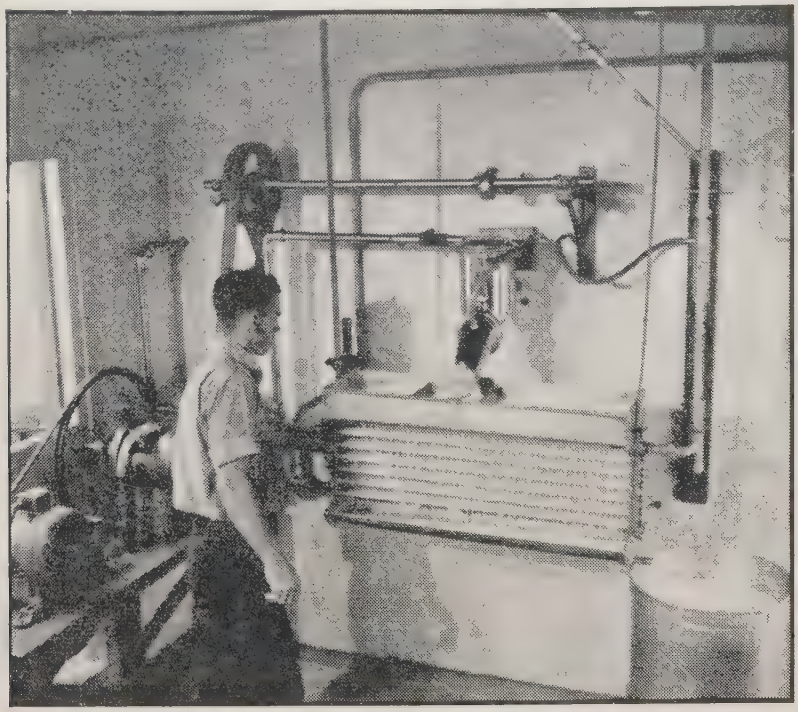
Another important factor in machine milking is to ensure that the labour units employed in the shed are in correct relation to the number of sets of cups in use on the machine. This will vary according to whether hand stripping is practised, but a sound and safe basis is one labour unit to two sets of cups where stripping is



[*National Publicity Studios photo.*

The cooling of milk and its elevation to a raised milk stand.

MILK COOLING AND CREAM SEPARATION



[*National Publicity Studios photo.*

The cooling of milk without elevation.

followed and one unit to three sets of cups where non-stripping is the rule. The need for a strict following of this procedure cannot be over-emphasised, as a correct ratio means that labour is available for the cups to be placed on the cows at the correct time when the let-down of milk is apparent, and that they can be removed from the cows immediately the milk flow ceases. If labour is in short supply, the number of sets of cups to be used should be reduced, as neglect to put the cups on at the correct time means some loss of production, while failure to remove them immediately milk flow ceases entails application of vacuum to udders not fortified with milk, which may cause injury to the ducts of the udder.

Research and practical experience show that hand stripping after machine milking is not necessary and does not increase yield. On the other hand, some cows, particularly those of the nervous type, may show a greater response and give better results if hand stripped.

The Cooling of Milk

It is highly important that milk for manufacturing purposes be effectively cooled, and surface cooling in a clean atmosphere is the most satisfactory.

Cleanliness of the equipment and of the air supply is very important and the tubular cooler, which also provides aeration, will give excellent results if these condtions are observed. A water supply from a bore connected direct to the cooler, through a tank if necessary, is desirable.

Modern milk lifts and elevators have simplified this procedure and provide a means whereby the milk can be cooled as it leaves the releaser without the necessity of a raising can. Better results are obtained by cooling the milk under the releaser and elevating it to the transporting cans, which are held on a well-ventilated milk stand at a higher level. It is more satisfactory to elevate milk after it is cooled than while it is warm, as there is less likelihood of churning and separation of the fat globules.

Separation of Cream

The principle of the separation of cream is to apply centrifugal force to the milk as it passes through the separator, resulting in the heavier portion—skimmed milk—being thrown to the outside of the bowl while the lighter portion—cream—is forced through the central discs.

As milk is fed to the separator it travels to the bottom of the bowl and is forced upward through the discs which provide the necessary resistance. Unsatisfactory separation and considerable loss of fat will occur if the speed of the separator is irregular or if it does not travel at the required number of revolutions, if the milk flow is greater than the capacity of the separator, or if the discs, by long usage, have lost some of their power of resistance.

The density of the cream, which determines to some extent its fat content, is governed by these points, and by adjusting screws which are provided on all separators. Assuming that each of the foregoing points is correct, adjustment to the density of cream can be made by these regulating screws, which provide additional resistance.

Regulating screws are of two types; on some separators they operate on the flow of cream as it leaves the separator and are called cream screws; on others they act on the flow of skimmed milk and are called milk screws. To produce cream of a thicker consistency, the cream screw is turned inward and the milk screw outward on the models where they are a feature. In both methods the result is obtained by the greater resistance holding the cream slightly longer in the bowl of the separator to enable the centrifugal force to throw out a little more of the skimmed milk.

Cream too thin in consistency is unsatisfactory both to the producer and to the manufacturing dairy, and the term merely means that it contains too much skimmed milk. For this reason such cream lacks a natural and full flavour. Being too thin, it is also subject to much greater agitation in transport, causing churning and metallic flavours. Churned cream, in which the fat has separated from the serum and coagulated in large lumps, is very common and is costly to the producer in that the churned fat cannot be included in the sample for butterfat testing. It is also costly in manufacture because much of such fat is lost in the buttermaking process. As it contains an undue proportion of skimmed milk, such cream also develops undesirable flavours rapidly, as bacteria feed on the milk sugar. The additional quantity to be handled at the dairy factory means the provision of extra equipment and cream storage space, and the transport system is required to handle unnecessary volume where cream too thin in consistency is produced.

Unsatisfactory separation and cream too thin in consistency are caused generally by the following faults:—

1. The driving belt of the separator being too slack, or slipping, or by an unsatisfactory drive causing irregular speed.
2. Separator being driven at too slow a speed, thus giving insufficient centrifugal force.
3. Feeding milk from vat at a capacity greater than can be handled efficiently by the separator.
4. Lack of resistance caused by worn discs and parts. The insertion of an additional disc will frequently overcome this fault.
5. Improper setting of the separator bowl or of the milk vat above the separator.
6. Incorrect adjustment of the regulating screws.

These essential points must be carefully controlled to ensure satisfactory separation and to avoid unnecessary losses. Far too great a quantity of cream too thin in consistency is received at dairy factories. This causes extra expense in transport and manufacture and does not assist the manufacture of products of the highest quality.

Home Gardens Benefit from Digging in July

By A. G. KENNELLY, Vegetable Instructor, Department of Agriculture, Christchurch.

WHETHER July or August is regarded as the beginning of the garden year depends on the district or on the situation of the garden, but in most gardens the work of sowing and planting is not commenced in earnest until August or even later. Small sowings of hardy subjects are, however, in order in most well-situated gardens where the soil is well drained and free working. Elsewhere garden work should be confined to such activities as clearing untidy areas, digging or trenching if the soil is in suitable condition, turning the compost heap, sorting over root crops in store, digging in green crops, or burning unwanted, diseased, or woody rubbish which cannot be composted.

JULY is a good time to dig over weedy corners, to clear away and stack tidily seed boxes, odd pieces of timber, garden stakes, and similar material which, unless it has a free circulation of air under and around it, is likely to provide congenial refuges for such garden pests as slugs, snails, millepedes, weevils, slaters, and earwigs. The weeds which so often surround untidy corners should also be cleared away, as they not only frequently serve as host plants for pests, but carry over virus diseases from one season to another.

Small sowings of such comparatively hardy subjects as spinach, silver beet, broad beans, carrots, turnips, radish, and "spring" onions can be made where climatic and soil conditions are favourable. In the less-favoured districts lettuce, summer cabbage, cauliflowers, and silver beet can be sown in frames, though if cloches are used, all the seed mentioned above can be sown in well-drained soil, provided the cloches are put in position 10 to 14 days before sowing to enable the soil to warm and to some extent to dry out.

Hardy subjects such as spring cabbage and shallots can be set out in manured and well-drained soil, and where climatic conditions are not too severe lettuce and cauliflower can also be set out. Established rhubarb and asparagus beds should be cultivated, and where conditions are warm enough to enable the plants to respond liquid manure can be applied.

[*Green and Hahn Ltd. photo.*

All rubbish collected during cleaning operations and which cannot be composted should be burnt.

[*Green and Hahn Ltd. photo.*

During July weedy patches should be cleaned up and the ground turned over to benefit from exposure to weather.

Where soil conditions permit the ground can now be prepared for new beds of rhubarb and asparagus. It should be deeply dug and organic manure such as farmyard or stable manure or blood and bone dug in. Deep digging is desirable on most heavy soils, as it improves drainage, which is an important factor in successful production.

Tubers of Jerusalem artichoke can be sorted over and small tubers planted in districts where soil conditions are suitable; potatoes in store can also be sorted over and rotted ones eliminated.

During wet weather tools can be sharpened and cleaned. Garden furniture, bins, shelves, and benches can be built or repaired. Soil can be sterilised and seed boxes made or repaired. Woody or diseased rubbish should be burnt and the ash stored in a dry place; other soft garden trash should be composted.

Where the ground is not too wet and sticky, areas cropped during the past season should be dug over or trenched to improve drainage and aeration. Heavy soils especially benefit from being left rough after digging to expose them to the frost and to expose harmful garden pests or their eggs to the weather or to birds. Some of the benefits of digging, particularly where the soil is heavy, may be summed up as follows:—

1. It provides better conditions for deep rooting. Plants are thus able to resist dry conditions better and the roots are encouraged to cover a greater area in their search for nutrients.
2. It mixes the organic matter with the soil and thus provides better opportunity for the beneficial soil organisms to function.
3. It allows such garden rubbish as weeds and crop residues to be disposed of without waste.
4. It improves aeration and thus tends to improve soil temperatures. By allowing the water to drain more quickly from the highly-fertile top layer of soil it prevents it from getting sodden and sour.

Consideration should now be given to planning the forthcoming season's production. The mistakes or shortcomings of the past season should be remembered and plans made to effect an improvement in the forthcoming garden year.

Broad Beans

It is not too late to sow broad beans and where they are appreciated and a first sowing was made in the autumn a sowing made now will provide a succession. They do not require special soil, but it is not advisable to sow them

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in a light soil which tends to dry out. They do well in fairly heavy, well-drained soil that has been thoroughly cultivated and into which has been dug a moderate amount of organic material such as compost or well-rotted farmyard manure.

Heavy soil should be deeply dug, preferably a considerable time before sowing, and though a small amount of potash is often beneficial, particularly on light soils or where disease is troublesome, the principal nutrient required on most New Zealand soils is phosphoric acid. A dressing of 2 to 4oz. of superphosphate per square yard usually gives good results, though a small amount of a nitrogenous fertiliser in addition to phosphoric acid and potash may be advisable on well-worked home garden soils.

Seed should be sown in double rows about 10in. apart, with the seed placed diagonally 4 to 6in. apart and 2in. deep in the bottom of a shallow trench or drill 3in. deep. Germination is usually good, but it can be speeded up by soaking the seed for 12 hours before sowing, and it is usually advisable to plant a few extra seeds at the ends of the rows to fill gaps. Though seed size is rather variable, a quart of seed will usually sow about 50ft. of double row.

Carrots, Turnips, Beetroot, and Radish

In well-drained soil in favourable situations small early sowings of carrots, turnips, beetroot, and radish can be made toward the end of the month. The soil should be cultivated thoroughly and worked to a fine tilth. It should be moderately rich in well-rotted organic matter; soil heavily dressed with organic matter for a previous crop is excellent.

For small sowings drainage can be improved and soil temperatures raised by making a raised bed or sowing on ridges. Sowing on a ridge is usually simplest and most effective, especially as at this time of year the soil does not usually dry out excessively.

Seed can be sown ¼ to ½in. deep according to whether the soil is heavy, moist, and cold, or light. dry, and warm. Rows are usually 12in. apart, though about 8in. is sufficient for the smaller varieties of radish. If seed is sown thinly in well-worked, free soil, radish need not be thinned and the carrots can be left until the thinnings are large enough to be used in soups and stews.

Early varieties of beetroot are best thinned to about 2in. apart, as otherwise the plants tend to grow lopsided. Turnips, too, are usually best thinned to about 2in. apart.

Good quick-maturing varieties suitable for sowing now are:—

Carrots: Early Scarlet Horn and Early Forcing Horn.

Turnips: Early White Milan and Early White Stone.

Beetroot: Crosby's Egyptian, Flat Egyptian, and Early Wonder.

Radish: French Breakfast and Red Rocket.

[*Sparrow Industrial Pictures Ltd. photo.*

In districts where conditions are sufficiently mild for maturing lettuce now the plants should be kept cultivated and weed free to encourage growth. Lettuce seed sown now will provide plants for late spring cutting, but in the colder districts seed should be sown under glass or in prepared soil in a warm, sheltered situation.

Lettuce

Seed of lettuce can be sown outside where conditions are favourable. A prepared bed in a sunny situation is desirable unless the soil is well drained and climatic conditions very good. Alternatively seed can be sown in boxes of prepared soil in a frame or cool glasshouse. Lettuces are tough and bitter if grown slowly, and if checked, they may make poor growth and fail to heart. Most varieties succeed best in cool, moist, well-drained soils that are well supplied with well-rotted organic matter. Weed control is very important, particularly in the early stages of growth.

Lettuce requires a constant and fairly high degree of soil moisture from seeding to harvest. Fairly heavy applications of well-rotted organic manure such as farmyard or stable manure or of blood and bone are advisable on most home garden soils. Usually they are best supplemented by a complete fertiliser applied at the rate of 1 to 2oz. per square yard, but on soils that are in good condition one or two nitrogenous side dressings of, say, nitrate of soda or sulphate of ammonia applied at the rate of ½oz. per square yard should give satisfactory results without the addition of other fertilisers.

Seed should be sown thinly ¼in. deep, and if outside, should be sown in rows 12in. apart; later the plants should either be thinned or transplanted to 8 to 12in. apart in the rows. Transplanting is satisfactory for the early sowings, though later in dry districts it is usually advisable to thin rather than transplant.

Varieties

Good varieties of lettuce suitable for sowing now are Imperial D and Imperial 615, though Imperial 847 and New York No. 12 have a wide range of adaptation and can be grown satisfactorily for a long period in most districts. Good strains listed as Neapolitan and Webb's Wonderful are also very adaptable and have given very good results over a wide range of conditions.

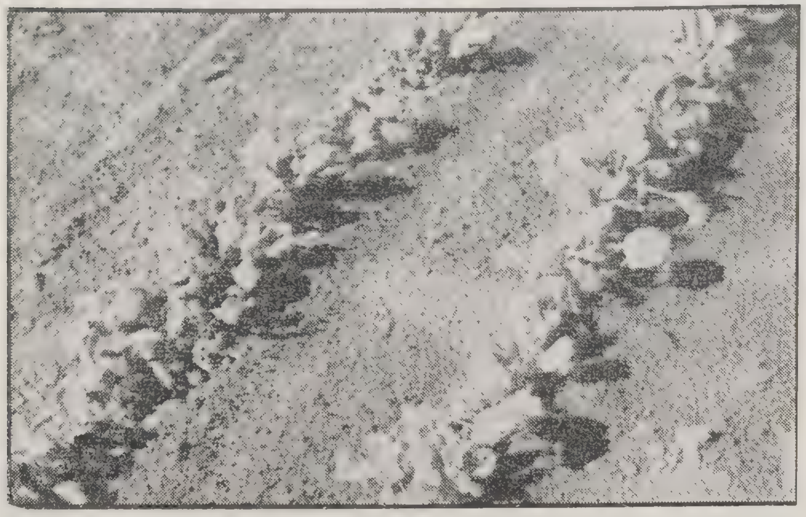
Potatoes

Though it is much too early in most districts to plant main-crop potatoes, a few tubers can be planted in warm, sheltered situations where there is very little frost; even where frost is fairly heavy some potatoes may be grown if the home gardener is prepared to keep top growth covered, usually by earthing it over to protect it from the frost. The soil should be well drained and should work freely. Even where it is not intended to plant for some time seed of early potatoes can be set in trays in a light, airy, frost-free situation to green and sprout.

Spring Cabbage

Spring cabbage set out in the autumn should now be developing well, as should spring cauliflower if conditions

THE HOME GARDEN IN JULY



[*Green and Hahn Ltd. photo.*

Cabbages and cauliflowers for early summer use can be sown now in boxes under glass or in the open where conditions are warm and sunny and the soil is well drained and can be worked freely. Seedlings should be sprayed regularly with a suitable fungicide such as Bordeaux if mildew is prevalent.

are not too severe. Where conditions are warm enough for good growth and the soil is lacking in plant nutrients plants will respond well to liquid manure. A small bag of such material as pig, cow, sheep, or poultry manure immersed for a time in water in a large container such as a 60-gallon barrel or 40-gallon drum will provide excellent liquid manure for most crops throughout the growing season. It should be applied according to the stage and conditions of growth; that is, in a weak state to tiny plants and slow growers and more frequently and in stronger concentrations to well-established, strong growers during the vigorous stage of growth.

Where organic manure or a suitable container is not available for making liquid manure an application of nitrate of soda or sulphate of ammonia can be given. Though sulphate of ammonia contains more nitrogen than nitrate of soda, either can be applied with safety to most established growing plants at the rate of 1oz. to 4 gallons of water.

Strong, well-developed spring cabbage and, where weather is not too severe, cauliflower plants can also be set out now for successional harvesting. In districts which experience a cold winter good, strong cabbage plants set out in a well-drained, favourable situation now will mature very little later than plants set out in late autumn. Seed of cabbage and cauliflower can also be sown as advised in last month's issue of the "Journal."

Standing and Stored Crops

Toward the end of July, particularly in northern districts, root crops such as carrots and parsnips commence to make second growth. Usually this is only top growth, and as it is the first stage of seed production, it is produced at the expense of the taproot. Roots should be lifted before the seed stem commences to develop and stored in a cool, slightly-moist, ventilated situation.

If sufficient quantities of potatoes and root crops such as beets, carrots, and parsnips are held in store to justify the treatment, sprouting can be prevented by dusting them with a preparation containing a growth-inhibiting plant hormone.

The Department of Agriculture has conducted a number of trials of the material on potatoes. It inhibits sprouting effectively, though of course for long storage it is important that temperature, ventilation, and humidity are satisfactory, if quality is to be maintained. In one trial potatoes treated late in the season (July), but before sprouting began, blackened more in cooking than did untreated potatoes, but this feature did not occur in trials elsewhere.

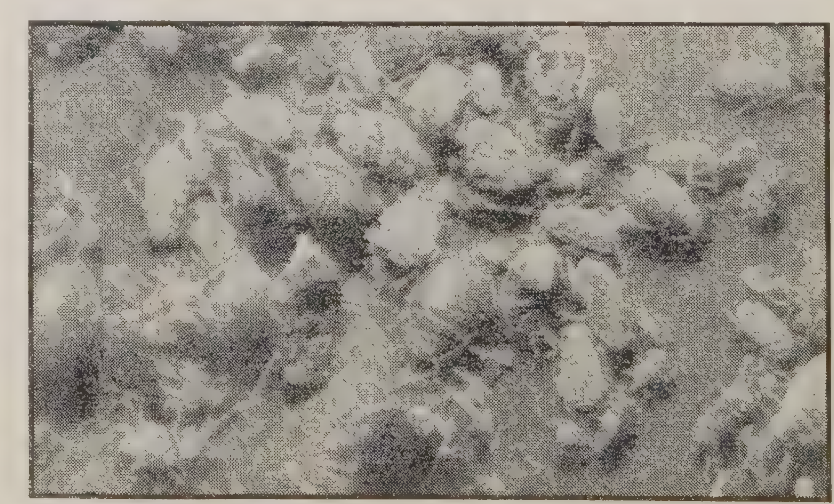
Though in general potatoes store well in bags, slatted boxes, or bins, root crops such as carrots, parsnips, and beet are best stored in damp sand or clean, coarse coal ashes or in a box sunk in well-drained soil in a shaded situation. A lid should be provided, and if desired, the roots can be packed in straw. Alternatively where roots are lifted to clear the ground or are put in a handy place for the housewife they can simply be heeled in at an angle or covered with light, moist soil in a cool, shady situation.

Standing crops of broccoli or winter cauliflower should be earthed up the stems if they are liable to be loosened by the weather. A leaf or two should be broken over the developing curds of cauliflower to give protection from frost, rain, and to some extent sun.

Compost

In recent years the making of compost in the home garden has become increasingly popular and important. The reason for this is probably largely the difficulty of obtaining animal manure as a result of the mechanisation of farms and the relatively-greater development of urban population because of industrialisation. In most soils that have been intensively cultivated for a number of years without the return of adequate supplies of organic material which can be converted to humus it is difficult to maintain a good tilth. They tend to break down and lack "body," and the maintenance of suitable conditions of moisture and aeration is thus difficult.

The importance in home gardens of returning all organic waste matter from the kitchen and garden to the



[*Green and Hahn Ltd. photo.*

Grey or cabbage aphides, which are rather mealy in appearance, can be controlled by spraying with nicotine sulphate. Where they have been troublesome on such crops as savoy cabbage or brussels sprouts care should be taken to destroy any small colonies that establish on spring cabbage. These aphides are roughly 6 times larger than natural size.

[*Photo News Ltd. photo.*

A simple type of compost heap which has been sealed with a layer of soil and left to mature. The smaller heap on the right is in the process of being built up.

soil can hardly be over-emphasised, and the properly-constructed compost heap offers a clean, odourless, and hygienic method by which waste material can be converted to vitally-needed humus.

Though the opinions of gardeners sometimes differ as to what humus is, in ordinary usage the word means the dark earthy mould produced at a late stage in the breaking down of organic matter—the dark granular or powdery substance which is an intimate component of all good growing soils. The organic matter from which it is formed includes the residues of plants, animals, birds, insects, fish, and fungi; in fact all material once part of something that was living.

The quality of any particular sample of humus is determined by such factors as its stage of decay and the kind of organic matter from which it was formed; for instance, whether or not it was rich in minerals. It is also affected to some extent by the sort of breaking down that mainly took place, which is in turn influenced by the nitrogen-carbon ratio and by temperature, moisture, and aeration, whether breaking down was brought about largely by micro-organisms that require the free air (oxygen) of the atmosphere or by those that derive their oxygen largely from other sources such as from the breaking down of other material, or whether sulphate of ammonia or similar activating substances and other fertilisers such as sulphate of potash and superphosphate were used.

Value of Humus

Humus is not only a source of plant food, but greatly influences the formation of the desirable crumby texture or structure of a soil; that is, a state of soil that predisposes the formation of good tilth. It adds to the cohesion of light soils and increases their capacity for retaining plant foods and moisture; it improves heavy soils and darkens light-coloured soils, causing them to warm more readily, and largely because vegetation grows so readily in it, it tends to prevent wind blowing away topsoil. The fineness of its particles and their cohesion give it a sponge-like capacity for absorbing and retaining moisture while facilitating the drainage of excess moisture, and it is thus of considerable value in preventing soil washing away or eroding under heavy rain.

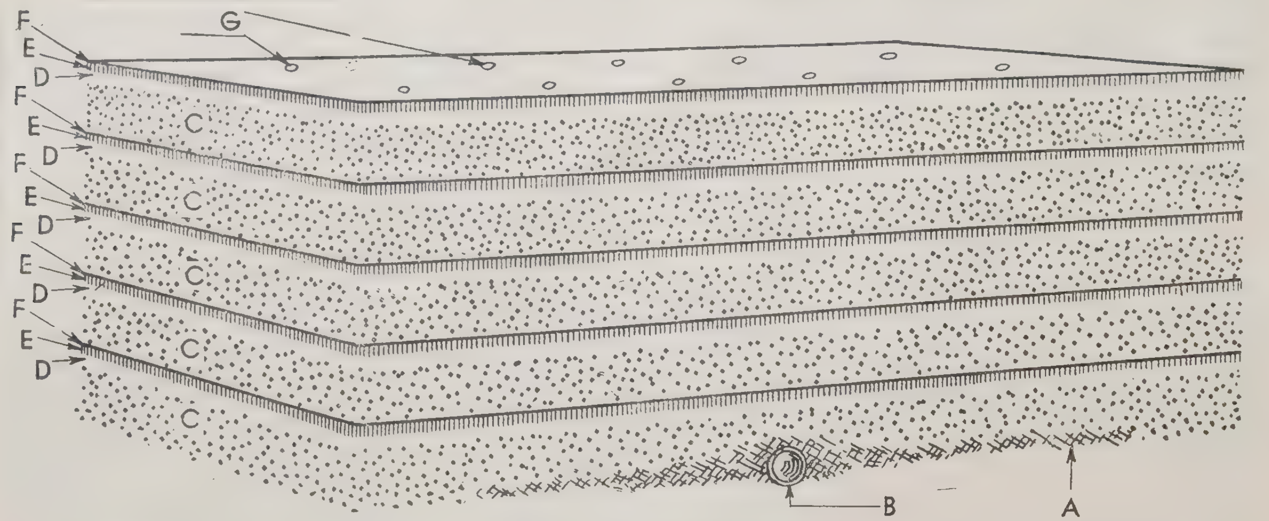
Humus reduces the stickiness of clay, particularly in the presence of a base such as lime, and thus improves aeration and drainage. There is also evidence that possibly because of the life it contains and because the organic matter of which it is composed gives off during decomposition carbon dioxide, a mild acid which renders minerals more available, it influences the nutrition of plants to a greater extent than is explained by the plant foods in it.

Successful gardeners everywhere agree that it is necessary to return to the soil all disease-free organic garden waste, but it is sometimes felt that in view of the work involved in building a compost heap, the attention that is required, such as tidying, watering, and turning, and the delay that must occur before the material can be dug in, it is preferable, and the actual loss of plant food very little, if garden trash is dug directly into the soil; usually an open trench is used in a part of the garden that is in process of being dug. Successive spits of soil are turned over every 2 or 3 days to expose a new trench as the old is filled with kitchen or garden trash.

This method of returning organic material to the soil is not without merit, and where only rank, soft, green vegetation in moderate quantities is to be dug in it is probably not inferior to composting in the orthodox way, but it is not always convenient, such material is usually limited, and some sort of heap usually becomes necessary in most gardens. Furthermore, temporary nitrogen starvation of crop plants usually follows the application of material which is very fibrous or woody or in which the nitrogen-carbon ratio is higher than about 1 to 15, as there is then a temporary increase in the ammonifying and cellulose-decomposing bacteria, which require nitrogen for food in making protein for their own bodies. As they use the readily-available forms of nitrogenous plant foods, particularly nitrates, they compete with the higher plants, causing severe nitrogen starvation and poor growth. Temporary acidity developed particularly during the early stages of decay is also likely to be a factor in depressing the growth of crop plants.

Some points in favour of a properly-made heap are that it is clean and hygienic and will not attract flies or have any offensive odour. It produces a complete plant food in a very desirable form from diverse materials and in a minimum of time. If the heap has been properly made, turned, and allowed to mature, the resulting compost will not only be a safe food for any plant, whether long established or just a seedling, but will improve any soil whatever its texture. Another point claimed in its favour is that in the properly-constructed heap the breaking down of some of the material will be caused by fermentation and this is said to give a superior product to that wholly obtained from putrefaction.

METHOD OF BUILDING COMPOST HEAP



The arrangement of material in building a compost heap. Layers of the material to be composted should be alternated with nitrogenous material (preferably some organic) and sufficient lime added to correct acidity. For best results the heap should be uniformly moist but adequately aerated. The top of the heap can be ridged if necessary to shed rain and to give protection from the drying action of the sun. If the heap is left level, it should be covered with a sheet of corrugated iron or similar material. A—Rough hedge clippings, similar woody material, or straw over most of the floor of the heap and at the end of the pipe to provide aeration. Alternatively a grid can be used. B—Pipe to provide air circulation. C—6 to 8in. layer of garden trash. D—1 to 2in. layer of organic manure or sprinkling of nitrogenous mineral fertiliser. E—Layer of soil. F—Layer of lime. G—Holes made with a crowbar or similar tool. In large or poorly-aerated heaps it is important that these are left open.

Material Unsuitable for Heap

Thick, woody stems such as those of brussels sprouts and cabbage (unless bruised and chopped), certain perennial weeds such as docks, convolvulus, and couch grass (unless the heap is very well made), printed paper in quantity, coal ashes, materials tainted with disinfectants, oil, creosote, paint, or preservative, and most plants or plant parts infested with harmful insects or bearing the spores of long-lived diseases should not be used in building a compost heap. They should be burnt and the ashes added.

Material which should be Used

Organic material (material formed from something that was living) of all kinds may be included if discretion is exercised in the layering. Sawdust and shavings in quantity are best rotted in a special heap, as they vary somewhat according to hardness and resin content in their resistance to rotting down organisms, and some take a long time to rot, but rags in moderate quantity, tea leaves, coffee grounds, scraps of waste food, seaweed, bones, feathers, and the dust and dirt collected by vacuum cleaners can all be used.

Location

Though the heap should not be exposed to hot sun or drying winds, it should not be placed in an entirely sunless and overgrown situation subject to excessive dripping or cold. Fungi, bacteria, and earthworms all play their part in the breaking down of materials in the compost heap and to allow them to function properly reasonable warmth, aeration, and continued moist conditions are essential. The heap should be fairly handy for the housewife and easily accessible with a wheelbarrow. Proximity to water is also a consideration where a large heap dries out quickly because of its situation. In large gardens it may be advisable to have two or more heaps to reduce carrying distances.

Building the Heap

For the home gardener the size of a heap will be determined mainly by the amount of material available, but whatever the shape, whether conical, pyramidal, square, or oblong, or whether it is high or low, the important points to consider are aeration, retention of moisture, drainage, and contact with bare, forked earth to facilitate entry of earthworms and soil organisms. Because a good supply of air is very important, aeration from the base should be provided either by a field or drain-pipe or a quantity of open material such as woody hedge clippings or both. Properly-constructed bins usually have a grid at the bottom to which air is supplied by a pipe.

Though methods of composting may vary widely in detail, the principles are similar in all cases. Layers of the materials to be composted are alternated with thin layers of farmyard manure or a good sprinkling of manure or nitrogenous fertiliser. Lime is usually added to reduce acidity and so enable bacterial activity to increase. Heaps are usually relatively long and about 3ft. 6in. to 4ft. wide, and rarely exceed 4ft. high. In heaps smaller than about 4ft. by 4ft. the ratio of exposed surface is disproportionately large in comparison to the volume, and the breaking down of the material is slowed. A bin is therefore preferable for small heaps. The rate of decay is largely dependent on the nitrogen content of the materials, together with the supply of moisture and air.

For retaining walls wood is best, but wire netting will serve. Stone, concrete, or iron is usually considered less satisfactory owing to the heat loss and difficulty of providing aeration; brick is more porous, and if ventilation is provided, will prove satisfactory. No floor other than earth is needed, though an air supply from the bottom is essential.

A special wooden container, or preferably a series of them built so that the compost can be turned successively as breaking down proceeds, is probably ideal for the home gardener. A box about 12ft. long by about 4ft. wide by about 4ft. high and divided into three compartments by movable partitions and a movable end to facilitate turning and removal of the compost is easy to make. Movable ends or partitions can be made of boards in slots. Bottom ventilation can be provided by wire netting or iron grids, with pipes to the outside if necessary.

Compost can be produced by using as an activator either organic material such as natural or artificial manure (for example, fowl or farmyard manure or dried blood) or a mineral fertiliser such as sulphate of ammonia used either alone or in combination with other organic or mineral fertilisers. Ground limestone should also be used to reduce acidity, as excess acidity slows bacterial action and so delays rotting.

Layers of the material to be rotted can be about 6 to 8in. thick and should be built up as shown in the diagram on this page. Green, sappy material should be laid loosely; drier and more strawy material should be moistened and firmed, but not compressed so that all air is excluded. The finer it is chopped and mixed the better.

Ideal Carbon-Nitrogen Ratio

The ideal carbon to nitrogen ratio for optimum breaking down is about 10 or 11 to 1. It should not be higher than 15 to 1 and sufficient nitrogenous material is therefore essential for speedy rotting. Layers of organic manure such as farmyard or poultry manure should be 1 to 2in. thick according to the amount of litter the material contains. The less concentrated it is, that is, the more litter it contains, the thicker it should be. If dried blood is used, it can merely be sprinkled on rather heavily. The manure can be topped off with a layer of soil and the next layer of trash then applied. Lime can be sprinkled either on the layer of soil or in the middle of the layer of trash.

When organic material for use as an activator is not available a more balanced plant food than that obtained by the use of sulphate of ammonia alone can be secured by using a mixture of 4 parts of sulphate of ammonia, 3 parts of superphosphate, 1 part of muriate or sulphate of potash, and 2 or 3 parts of ground limestone at the rate of about 6lb. to 1cwt. of mixed, average, partly-wilted garden trash. The more strawy the material the more sulphate of ammonia is required; the lime then may also have to be increased. As an activator sulphate of ammonia, if used alone, should be applied at the rate of about 2lb. to 1cwt. of mixed, partly-wilted garden trash; about 1 to 2lb. of carbonate of lime should also be added.

Rotting is usually speeded by making vertical air vents 3 to 4in. in diameter at the top with a crowbar or tool such as a rake handle at intervals about 1ft. from the sides of the heap. Though much depends on the material and layering, the temperature should rise within a week or two of the completion of the heap.

When the heat begins to decline in from 3 to 12 weeks according to temperature (rotting is quicker in summer than in winter) it should be turned. The heap should by then have sunk by about a third. Turning is done by mixing the layers and turning the unrotted outside material to the middle. The heap should be kept moist, but not wet, and it should be tested periodically for moisture content by inserting a stick and examining the adhering material for moisture when the stick is withdrawn.

[*Green and Hahn Ltd. photo.*

A compost box fitted with a lid to shed rain and slatted sides to facilitate the removal of any section.

A roof or covering is often desirable so that the heap is neither soaked by rain nor dried excessively by the sun. An unsheltered heap can be ridged to an inverted V to help shed rain. Exposed portions of the heap can be covered with a layer of soil 2 to 4in. thick (the lighter the soil the thicker it should be and the thinner the heavier) to retain heat and moisture and to prevent the heap attracting flies. Regular spraying with D.D.T. will give additional protection. If the sides are to be covered with soil, they should slope slightly.

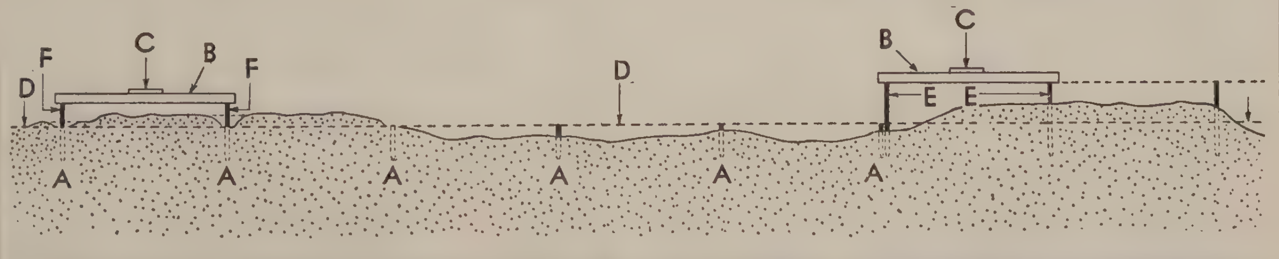
Applying Compost to the Garden

The amount of compost available in most home gardens is strictly limited. It can be used to the best advantage in the top 4in. of soil. If it is properly rotted, it can be placed in the seed drill. Most kinds of seeds can be sown in it, though when used for seeds such as peas or if there is a doubt about its ripeness, it is better placed 2 or 3in. below the drill. It is also useful in "pockets" in which plants such as tomatoes or cauliflowers are set out.

Compost can be stored quite well until required if it is kept moist and cool and aeration is reduced. Under these conditions oxidisation or the "burning" of the humus, which is a continuous process in the presence of air, is greatly retarded.

Composting Straw

When organic material such as farmyard or poultry manure is difficult to obtain for digging into the garden, properly-composted straw is a good substitute. About 5 to 6lb. of sulphate of ammonia and about 6lb. of carbonate of lime are required for each hundredweight of straw to be composted. A layer of straw about 6 to 8in. deep should be soaked with water and then sprinkled with sulphate of ammonia; another 6 to 8in. layer of straw should then be added



In gardens where the ground is undulating or has a slight slope many garden jobs can be done more expeditiously if the ground is levelled. The equipment needed for the work is a straight-edge, a spirit level, and a number of pegs. The pegs are driven into the ground and the level established by the straight-edge and spirit level according to the method described on the following page. A—Pegs to mark the desired level. B—Straight-edge. C—Spirit level. D—Desired level. E—Long pegs each marked at an equal distance from the top. F—Additional pegs of equal length on which to rest the straight-edge.

and, after being dampened, sprinkled with carbonate of lime. The process should then be repeated with the 6 to 8in. layer of wet straw, sulphate of ammonia, straw, carbonate of lime, etc., until the desired height is reached. A 3in. layer of poultry or farmyard manure can be substituted for the sulphate of ammonia if desired, or a mixture of 4 parts sulphate of ammonia, 3 parts of superphosphate, 1 part of sulphate or muriate of potash, and 2 or 3 parts of ground limestone can be used at the rate of about 9lb. to 1cwt. of straw.

Levelling

Where it is necessary to water heavily or to irrigate, land should be level or nearly level. Though it is not practicable to level steeply-sloping land except by terracing or levelling it in sections, it is frequently advantageous to level gently-sloping land or land that is very gently undulating.

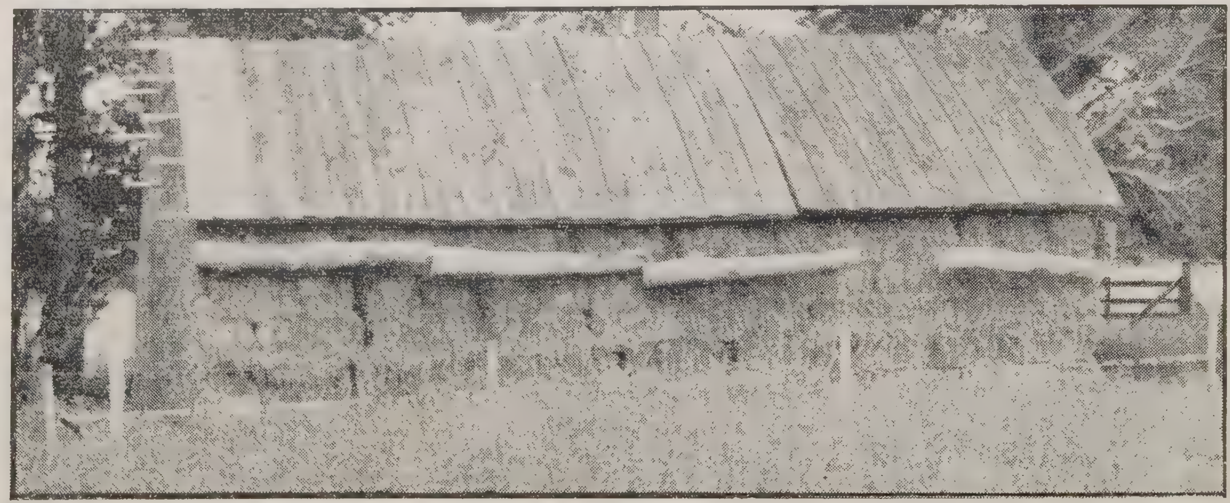
The equipment needed for the work is a straight-edge at least 6ft. long, a spirit level, and a number of pegs. Except when working in a confined area, the longer the straight-edge is the better, provided it is not too heavy to be handled conveniently. A length of ordinary timber such as a plank about 5 or 6in. wide and about 1in. thick will serve as a straight-edge if its two edges are straight and exactly parallel. A small amount of sideways sag will not spoil its effectiveness, provided the edges remain true.

Unless long pegs are used, as at E in the diagram on the preceding page, the longest pegs needed will have to be at least equal in length to the distance from the bottom of the deepest hollow to the height of the final level plus enough length to hold the peg in the ground. Where there are deep hollows or mounds some preliminary levelling should be done first so that a reasonably accurate estimate of the best level at which to set the pegs can be made.

Usually the preferred level is that which entails a minimum of soil shifting; that is, soil to be removed from high areas should exactly fill the hollows without the need to bring in or cart out extra soil. An important point when removing very high mounds is that the infertile subsoil may be exposed. If that is likely to happen, some of the fertile topsoil should first be put to one side to be applied in the later stages of levelling.

When the height of the level has been decided pegs should be driven into the ground in several parallel lines across the area. The distance each peg is apart is usually determined by the length of the straight-edge, though where a very long straight-edge is used pegs may be considerably closer. Unless a long peg marked at a fixed point from the top is used, soil should be removed when a peg is driven into a mound to enable the top of the peg to reach the desired level. In finding or checking that level against other pegs the tops of which are exposed a "cutting" may be made through the mound to permit the straight-edge to be levelled at the desired depth. Alternatively the straight-edge can be nailed to or rested on the tops of two additional pegs each of equal length, the bottoms of each being rested on the tops of the pegs which indicate the final level.

A Wooden Cover for Stacked Hay



THE use of hay as an adjunct to roots and lupins for winter feeding of stock in Canterbury has increased very materially in the last 10 years. The Statistical Report on Agricultural and Pastoral Production indicates that there has been a fairly steady increase in the area cut for hay and silage between 1935-36 (38,244 acres) and 1946-47 (67,065 acres); only a small proportion of the total (less than 500 acres in 1946-47) is silage.

Every new idea introduced on a farm, or even the expansion of an old idea, invariably brings its problems, and in this respect the making of increased quantities of hay is no exception. One of the difficulties as far as haymaking is concerned is to devise an efficient way of covering the stacks to obviate undue waste.

The farmer who has sufficient shed room to store his hay or who possesses a Dutch barn is fortunate; the bulk of the hay in Canterbury has to remain outside during the winter. Many farmers cover their stacks with straw, but because of the widespread use of the header harvester, even straw is sometimes difficult to obtain, and what is available is usually of poor quality for thatching. Today the use of corrugated iron is out of the question, and the life of canvas or treated-sack covers, particularly in localities subject to very strong winds, is comparatively short.

To overcome the difficulties mentioned Mr. R. J. S. Wilson, Highbank, Mid-Canterbury, has adopted the type of stack covering illustrated above. The cover is made in sections of any light exotic timber (*Pinus radiata* for example). Each section is 6ft. wide by 10ft. long and consists of 5 2in. x 2in. purlins covered with 8in. x ¾in. boards, spread 4in. apart, and cover boards of 6in. x ¾in. timber, thus giving a 1in. lap each side. These sections are made on the ground with purlins at each end and intermediate purlins spaced evenly.

It is advisable to fix the cover boards with nails which are long enough to be clinched under the purlins. Before being used the sections should be treated with old engine oil or some other preservative. Each pair of sections is wired together at the apex and held in position by weights on the windward side. The original sections made by Mr. Wilson were 10ft. square, but these proved too big and cumbersome. The present sections (10ft. x 6ft.) can be placed in position quickly by 3 men.

—**G. K. McPHERSON**, *Instructor in Agriculture, Department of Agriculture, Ashburton.*

The Provision of Access

IN providing access to a dwelling, a shed, to a room inside a dwelling, or from one place to another where a change of elevation from a low to a higher level must be made, it is not always easy to decide how best the work may be done so that a minimum of fatigue is caused to the users of the access. All too often the question of fatigue is never considered and access is provided suitable for young, active people, but far too tiring for those of more mature years. This article by H. W. T. Eggers, Engineer, Department of Agriculture, Wellington, discusses points which should be considered in planning access and the observance of which will mean increased comfort and the reduction of fatigue.

MAN'S natural form of locomotion is to walk, and walking, being movement, demands energy. Energy can be measured and its measurement is based on three factors—weight, distance, and time. As man must provide energy for his propulsion and the amount of energy required at any period will depend on the weight, distance, and time factors, a better distribution of energy with less fatigue will result if these factors are given due consideration in planning the provision of access. Fig. 1, which shows a dwelling constructed on a level on a hillside 20ft. above the roadway horizontally and 30ft. back vertically, illustrates this point. Because of the situation of the house the ground between house and road slopes at an angle of 34 degrees. Access from the road to the dwelling can be provided in two ways, either by a flight of steps directly up the slope or by the construction of a zig-zag path traversing the slope. These two methods are shown in Fig. 1.

If the flight of steps has 6in. risers (the upright parts between steps), there would be 40 steps to give elevation to the vertical distance of 20ft. An average person of 10 stone or 140lb. climbing the steps at a normal speed of 80 per minute would have to exert sufficient force to raise 140lb. 20ft. in 30 seconds, that is, 2800 foot pounds in 30 seconds or 5600 foot pounds in 1 minute.

The slope of the zig-zag path should not be more than 1 in 6 for comfort and with a 30ft. frontage the house level could be reached in four passes each about 30ft. long; that is, the climber must travel 120ft. horizontally to raise his weight 20ft. vertically. With an average pace of 2ft., 60 paces would be required to negotiate the path and at 80 paces per minute the time taken would be 45 seconds. The climber in this case must therefore exert sufficient force to raise 140lb. 20ft. in 45 seconds, that is, 2800 foot pounds in 45 seconds or 3732 foot pounds in 1 minute.

In this example it will be seen that though the ultimate effort required to raise a given weight a given distance is the same in each case (2800 foot pounds), the choice of a zig-zag in preference to steps ensures that the energy will be expended with less fatigue, as the provision of a zig-zag increases the distance travelled and thereby the time taken over which the energy is expended.

Paths

The basic principle of hill-path construction is to reduce the slope by increasing the length. By doing this the time necessary to raise oneself from a lower to a higher elevation is increased, with a corresponding reduction in the momentary effort required. Provided the pace is constant, the same work is done over a longer period, so less must be done per time unit.

This principle is illustrated in Fig. 2. If the pace or speed of travel is constant, the effort required to raise weight A through distance B is the same for slopes G, H, and I. But as the time factor C is increased by reducing the slope from G to H or I, the effort required per unit of time is less, with the result that the change of elevation is achieved with less fatigue.

Steps

Owing to restricted space it is not always possible to obtain sufficient length to enable a path with a satisfactory slope to be constructed and steps are then the only method possible. The two general principles of step construction are:—

1. Height of risers and width of treads should be so proportioned to vertical and horizontal distances that all steps are even and proportioned to induce least fatigue.

2. Single flights should not be too long, but should be broken where possible by a flat or incline landing.

The first principle can be illustrated by being applied to the steps in Fig. 1. The height of the risers must be a divisor of the vertical distance (20ft. = 240in.) and the width of treads a divisor of the horizontal distance (30ft. = 360in.). The number of treads must also be the same as the number of risers. This can be tabulated as follows:—

RISERS

Vertical distance 240in.

Height in.	Number
4	60
5	48
6	40
8	30

Both 4in. and 5in. steps are too low to be really comfortable to negotiate,

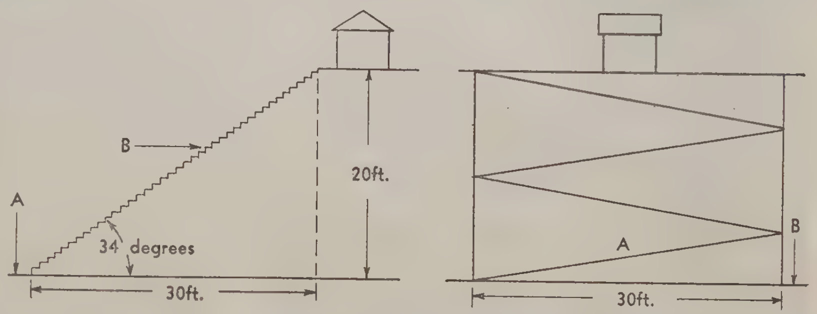


Fig. 1—Two methods of providing access to a house on a hillside. Left (side elevation): Access by a flight of steps. A—Roadway. B—40 steps with 6in. risers. Right (front elevation): Access by a zig-zag path. A—Slope 1 in 6. B—Roadway.

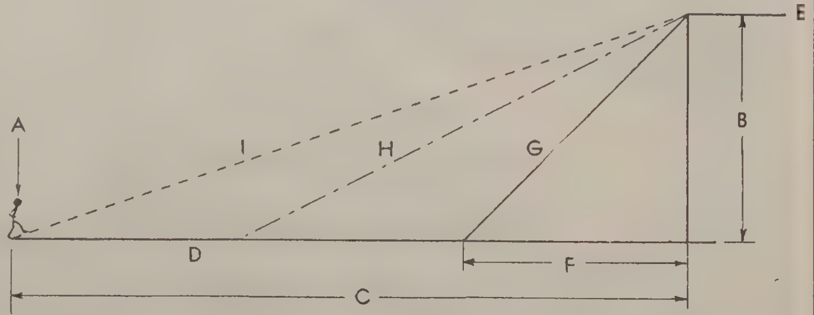
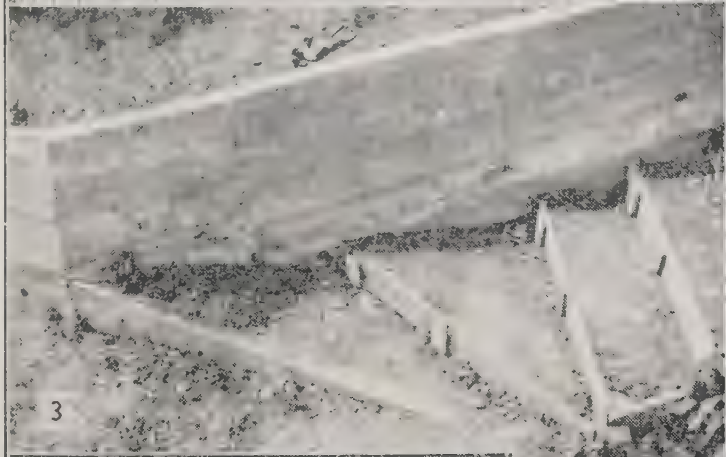


Fig. 2—Effect on horizontal distance and time factor of decreasing the angle of slope. As the angle of slope decreases the horizontal distance and the time factor are increased, so that the effort required per unit of time is lessened. A—Weight factor. B—Vertical distance. C—Time factor. D—Lower elevation. E—Higher elevation. F—Original horizontal distance. G—Original slope. H and I—Slopes resulting from increasing F.

DESIGNS OF STEPS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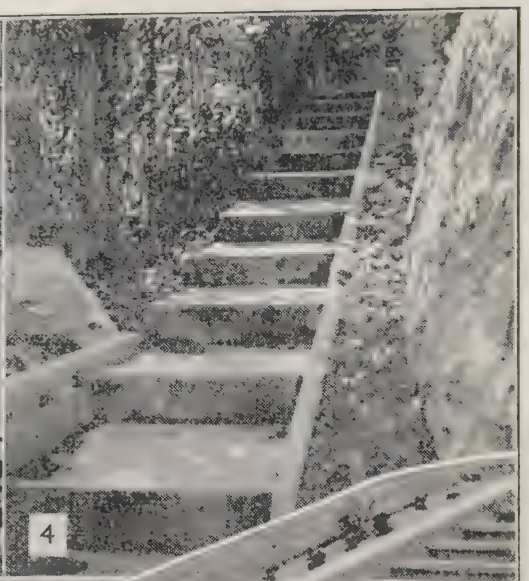
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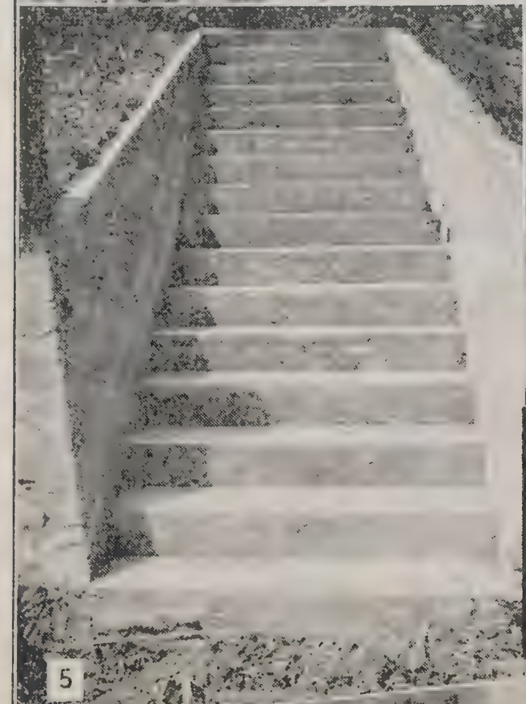
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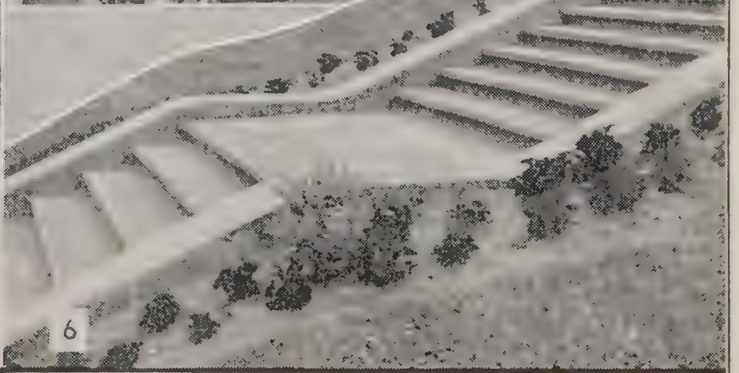
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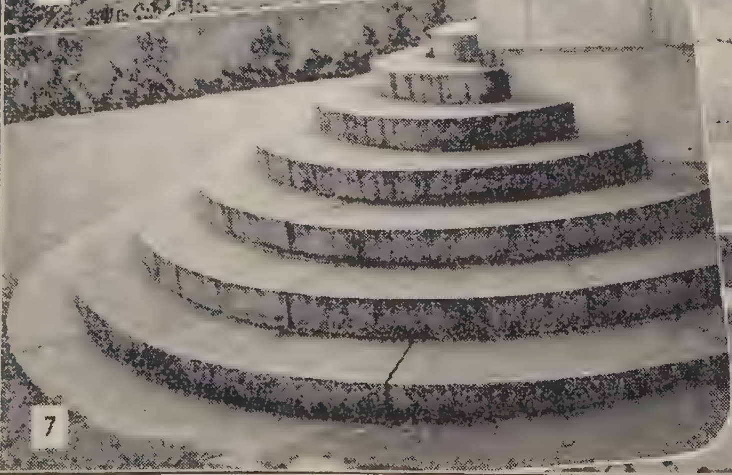
Fig. 3—Steps starting off at an angle to the roadway. Fig. 4—Incline treads such as these may become slippery during wet weather. Fig. 5—Steps which allow for a gradual change of direction to the left. Fig. 6—A well-designed flight of steps broken by a landing. Fig. 7—Ornamental circular steps. Fig. 8—Steps describing a curve.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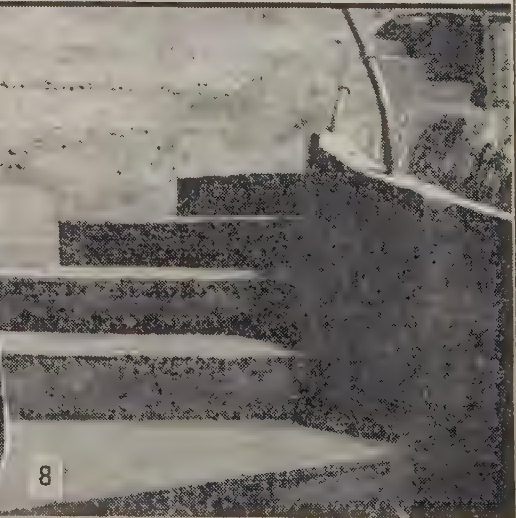
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and an 8in. step is too high. Of the four sizes chosen the 6in. is the easiest. When the height of riser and thereby the number of steps have been decided, the width of tread can be calculated as follows:—

TREADS

Horizontal distance 360in.
Number of steps 40

Width of tread is $\frac{360}{40} = 9$**in.**

The working power of the average person is about ⅛ h.p. or 4125 foot pounds per minute, so climbing the full flight of 40 steps at a normal pace would require more than normal effort (5600 foot pounds per minute). By applying the second principle and dividing the flight into, say, two sets of 20 steps and providing a flat landing between the two sets the distance and thereby the time factor can be increased with a corresponding decrease in momentary effort.

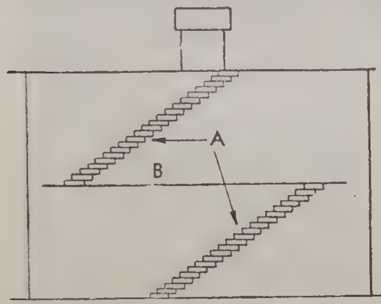


Fig. 9—Dividing a flight of steps in two by the provision of a landing. A—20 steps with 6in. risers. B—Flat landing.

Fig. 9 shows how this can be done. Two flights of 20 steps each are run obliquely across the slope and joined in the middle by a flat landing. This is the theory of the construction of a zig-zag applied to steps instead of an incline path, the object in both cases being to increase the time factor.

Though there is no definite proportion between risers and treads, a certain relationship is desirable for both appearance and comfort of use. As the 5in. riser in a flight of steps is too low to be comfortable and the 8in. too high, the most comfortable step will be between these limits. The width of treads may be increased by nosing; that is, by projecting the tread over the riser, but in every case a sufficiently-wide tread should be provided to ensure landing for the full length of an average size shoe sole for short flights and the full length of the shoe, including the heel, for long flights.

If the normal slope is too steep (the vertical distance is too great in relation to the horizontal) to permit the construction of steps suitably proportioned to meet requirements of comfort, the horizontal distance must be increased until reasonable proportion between risers and treads can be obtained.

Fig. 10 shows graphically the proportioning of risers and treads of steps for different uses.

It will be readily apparent that many variations are possible with combinations of steps, flats, and inclines, but any combination chosen should be that which is not only best suited to the ground contour but also to the elimination of fatigue.

There is a very wide range of design for steps. They may start off at an angle to the roadway as shown in Fig. 3, they may change direction slightly halfway up as shown in Fig. 5, or they may describe a curve as in Figs. 7 and 8. Fig. 6 shows a well-designed flight of steps broken by a landing, and Fig. 11 shows unsatisfactory steps made without consideration of design.

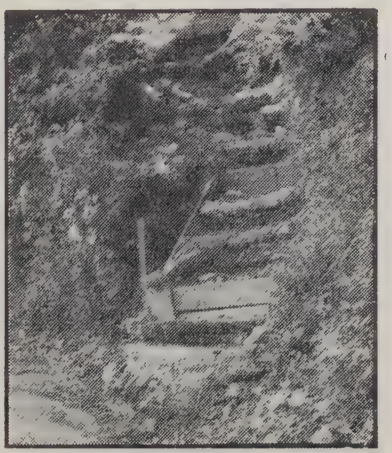
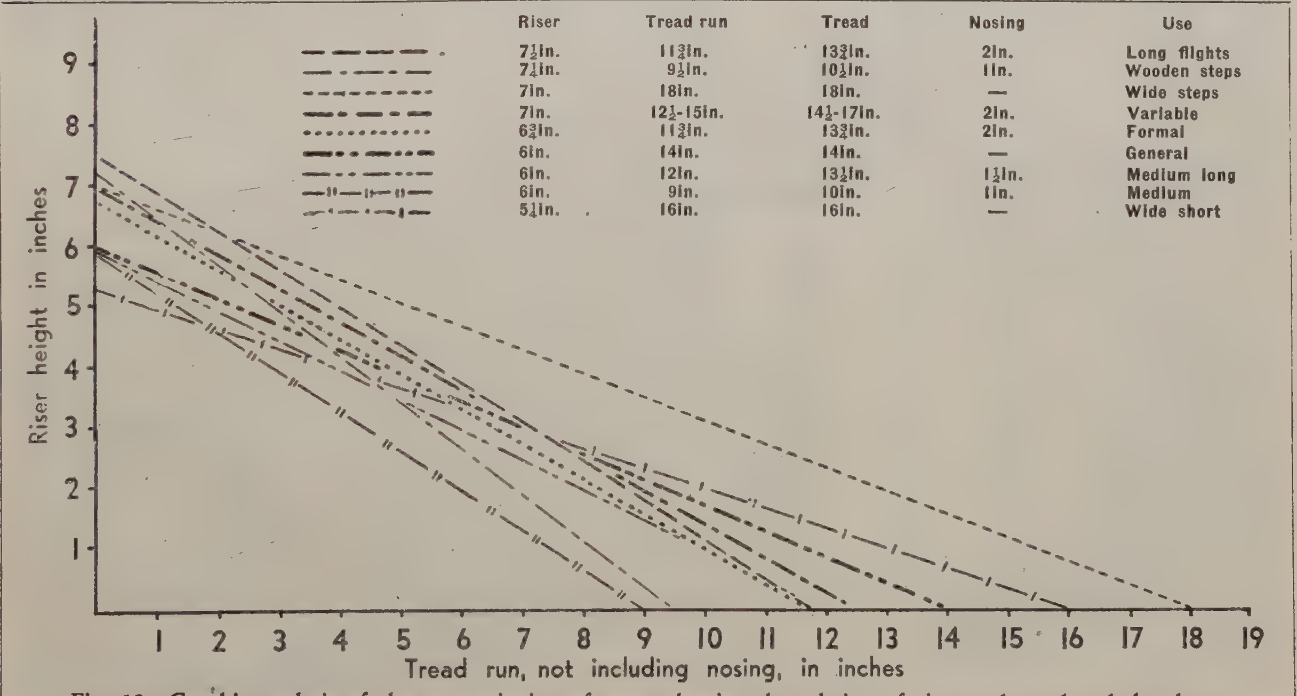


Fig. 11—Unsatisfactory steps made without consideration of design.

Except for only enough slope to permit drainage, steps should not be constructed with incline treads as shown in Fig. 4, because they may become slippery during wet or frosty weather and be hazardous. The edges of treads of steps likely to be used in the dark should be painted white, as this gives clearer definition. Steps to the hay-loft either inside or outside the building and steps to the attic should all be planned with the aim of saving fatigue and thus conserving energy for more important work.

Just as a big tractor would not be used for work which can be done by a smaller one, the human body should not, except for necessity, be asked to put forward a large effort when the same work can be done with less effort spread over a longer period.



	Riser	Tread run	Tread	Nosing	Use
— — — —	7½in.	11¾in.	13¾in.	2in.	Long flights
— - — - —	7¼in.	9½in.	10½in.	1in.	Wooden steps
- - - - - - - -	7in.	18in.	18in.	—	Wide steps
— - — - —	7in.	12½-15in.	14½-17in.	2in.	Variable
• • • • • • • •	6¾in.	11¾in.	13¾in.	2in.	Formal
— • • — • • —	6in.	14in.	14in.	—	General
— - - — - - —	6in.	12in.	13½in.	1½in.	Medium long
—॥—॥—॥—	6in.	9in.	10in.	1in.	Medium
—ˑ—ˑ—ǀ—	5¼in.	16in.	16in.	—	Wide short

Fig. 10—Graphic analysis of the proportioning of steps, showing the relation of riser and tread and the slope.

MACHINE MILKING AT RUAKURA

These illustrations of machine milking at Ruakura have been reproduced from "still" photographs taken from the film. Upper left—W. G. Whittleston operating one of his testing devices in a milking shed. Upper right—One of the milking sheds at Ruakura. Middle—A ¼-scale model of a milking plant prepared for the film and general demonstration purposes. Lower left—An improved sight glass devised by Whittleston. Lower right—Testing for leaks with a lighted match.

"EFFICIENT MACHINE MILKING": Outstanding New Zealand Documentary Film

CO-OPERATION between the science and practice of dairying has been advanced another stage by the production of the documentary, instructional film "Efficient Machine Milking." Machine milking has brought about radical changes in the dairy industry and now another modern development, the film, has enabled the latest techniques and research data to be brought to the notice of farmers in an interesting and authoritative form.

"EFFICIENT Machine Milking," which runs for 25 minutes, was directed by Margaret Thomson of the National Film Unit and was produced for the New Zealand Department of Agriculture and the New Zealand Dairy Board. Its message is plain and its theme simple—how to keep milking machines at their peak efficiency for the extraction of milk from the cow—and the film presents the practical results of many years of research by W. G. Whittleston of the Department of Agriculture's Animal Research Station at Ruakura.

Milk extraction has become a highly-specialised job; every milker must be something of an engineer and must understand the functions and working of each part of his machinery. With very effective use of a model machine especially constructed at Ruakura, the film takes the audience through all the processes of the milking plant.

In the film each essential piece of equipment—the vacuum pump, vacuum tank, and vacuum gauge, the relief valve, the pulsator, the sight glass, the teat-cups, airline, milk pipe, the releaser pulsator, and the releaser—is shown separately and its purpose and the routine for proper care and maintenance shown; examples are also given of snags which often arise during milking.

Throughout the film emphasis is placed constantly on simplicity in design and layout of the plant; the dangers and waste involved in the use of unnecessary gadgets and chaotic unplanned mounting of the equipment are spotlighted. Some new and improved parts are shown in operation, including a specially-designed weighted relief valve which has been developed at Ruakura after exhaustive tests.

Considerable time is devoted to the pressure gauge. It has been found that more than 50 per cent. of the gauges in use in New Zealand are faulty, and unless these gauges are accurate it is impossible to run plant efficiently. The gauge is a very delicate and sensitive instrument; careful cleaning and adjustment is necessary to permit it to indicate the true vacuum, and at least every 6 months gauges should be checked and reset by an expert. Too high a vacuum will damage the udder and cause discomfort to the cow and it is essential that gauges should indicate the vacuum accurately.

Another improvement shown in the film is a more effective type of sight glass. It is pointed out that the usual type of commercial glass gives good service, but due to milk splash when very little is being obtained from the cow it is difficult to decide exactly when milking is finished. The improved type which is shown empties completely when the rate of milking has fallen below ½lb. per minute, and at this rate the cow has finished milking and the cups should be removed. The correct placing of the sight glass is another important point which is stressed. It must be sited where it can be seen from all parts of the shed and the practice of mounting it near floor level, requiring the milker to walk half-way across the shed to see his glass, is not satisfactory. Experiments have shown that low siting in the bail has no advantages and a good sight glass correctly placed is necessary for efficient and safe milking.

Again and again the message is made clear: Keep the plant down to the simplest essentials. With use of the example of the calf and the cow it is driven home that the calf gets its milk by the direct route; there are no gadgets to impede the flow from the teat to its stomach. The cow appreciates and responds to this method and contented cows milk faster than those milked with plant fitted with strange devices, neither useful nor ornamental, which slick-talking salesmen often persuade farmers to buy.

The second part of the film still keeps to the same main theme, but handles it from the point of view of accidents which are likely to occur even in the best-organised sheds.

The vacuum is one of the most constant sources of trouble and methods of testing and identifying weaknesses are demonstrated. Leaky flaps in the releaser and slack inflations are other problems dealt with.

The following creed for effective care and maintenance is given:—

Fill the lubricators before milking.

Check all air-admission holes.

Make sure that the relief valve is working properly and that the gauge reads 14 to 15in.

Every week oil the pulsator slides and check them for seating. Inspect all bearings and drives and oil the pulsator drive.

Check the releaser, vacuum tank, and joints for leaks.

Check for tightness of the inflations.

Every fortnight dismantle the cups and soak the inflations and all tubes in boiling caustic soda solution for 2 hours.

C. P. McMeekan, Superintendent at Ruakura, who in an interview in the film emphasises five important points for efficient milking.

And finally, at 6-monthly intervals, see that the whole plant is overhauled by an expert.

During the course of the film C. P. McMeekan, Superintendent at Ruakura, is interviewed and in summarising he again emphasises the main theme. He makes five important points for efficient milking:

First, win the cow's co-operation by kind handling.

Second, stimulate her to start the milk flow.

Third, strip with the machine.

Fourth, remove the cups immediately after the milk has ceased to flow.

Fifth, operate the machine carefully, using the methods shown in the film.

This is a first-class documentary film, probably one of the best ever made in New Zealand, and it compares more than favourably with anything produced overseas. The subject is of vital importance to all dairy farmers and is backed by the authority of Whittleston, whose work is internationally recognised.

Films are powerful mediums for education and instruction; the success of "Efficient Machine Milking" makes it imperative that others on related farming topics should also be produced. This film is full of interest, simple, clear, and authoritative, and should be shown to dairy farmers throughout New Zealand. No one seeing it can fail to be impressed, and credit must go to the National Film Unit, who made it, the New Zealand Department of Agriculture and the New Zealand Dairy Board, who sponsored it, and to that body of enthusiastic workers at Ruakura, especially Whittleston, who made its production possible and necessary.

Efficient Machine Milking; 25 minutes; black and white with sound track.

—*K.G.F.*

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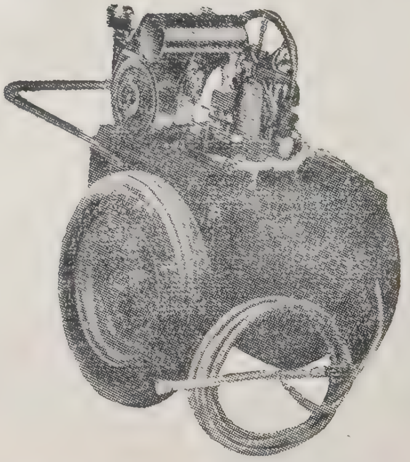

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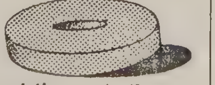

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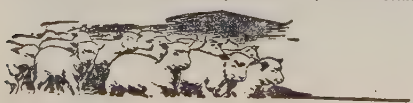

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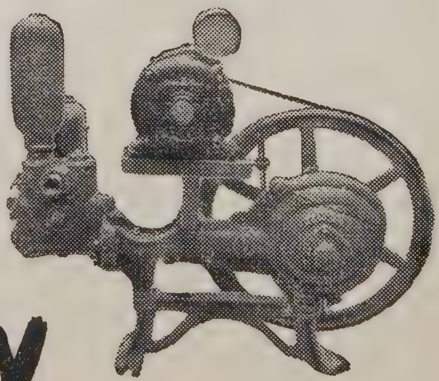

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Experiments with Chemical Control of Ragwort

RAGWORT *(Senecio jacobaea L.)* has been a serious weed in New Zealand for at least 50 years. It was first recorded near Dunedin in 1874 and by the beginning of this century had spread to practically all districts in which it is prevalent now. Attempts have been made to eradicate the weed during this period, but all have met with only limited success. Sodium chlorate was first tried about 1930 and rapidly proved a most promising chemical for ragwort control, and not until recent years with the discovery of the hormone-type weedkillers were any materials approaching it in effectiveness found.

AS is stressed by Poole and Cairns (1), the root system of ragwort is extensive and shows phenomenal powers of regenerating new plants (termed "root regrowths") from small fragments of root. When the shoot, either with or without the major part of the root system, is destroyed by cutting, burning, or chemicals, small unharmed sections of the roots are able to send up shoots and form new plants.

Distinguishing between these root regrowths and seedlings is very difficult. Many early workers (2, 3, 4) assumed that they had completely killed all ragwort plants with sodium chlorate, but it is probable that many of the new plants appearing and classed as seedlings were, in fact, root regrowths. Thompson (5) showed clearly at Ruakura that in most cases the kills obtained with sodium chlorate are not complete. Nevertheless, he pointed out that despite such limitations this chemical may be usefully employed to control ragwort.

Results obtained with the hormone weedkillers have been very similar to those obtained with sodium chlorate. From the nature of the material it was hoped that the hormones would be able to penetrate to all parts of the root system before the plant died and give complete kills of plants. Unfortunately, that has proved difficult to do. In general terms it may be said that the hormone-type weedkillers have little, if any, greater killing power than sodium chlorate.

Ragwort is classed by the Weeds Committee (6) for its reaction to hormone-type weedkillers as a "susceptible plant but complete control unlikely with a single treatment."

Summary of Experiments

A total of 15 field trials with ragwort using the hormone weedkillers has been conducted in the Rotorua, Taranaki, Wanganui, Manawatu, and Wairoa districts, while intensive studies have been made at the Rukuhia Soil Fertility Research Station, Hamilton, and in the surrounding district. Ten of the field trials have sufficient data to form conclusions, and the results from these trials can be summarised as follows:

1. Spray applications of 2 to 4lb. per acre of 2, 4-D or M.C.P. acid (the base of the 2 most common forms of hormone-type weedkillers) have given reasonably-satisfactory control of ragwort, though regrowths usually appear later from unkilled portions of the root system (root regrowths) and seedlings germinate satisfactorily on sprayed plots. This quantity of spray material is applied in 2 to 4 gallons per acre of the standard concentrations (about 10 per cent. of most commercial preparations). If information about the strength of the material is not given, farmers are recommended to apply hormone-type sprays at the heavier rates recommended by the manufacturers. Dilutions have little effect on the degree of control, and the "low-volume" applications of concentrated weedkiller give satisfactory results.

2. Hormone materials applied as dusts have been relatively ineffective even when applied at very heavy rates.

> SOME publicity has been given in New Zealand recently to work in England with hormone-type weedkillers which might lead to a belief that complete control of ragwort is possible with these chemicals. As comprehensive trials conducted in New Zealand by the Department of Agriculture do not entirely confirm these results, it was considered desirable to publish the information available to date from these experiments. This article has been compiled by P. B. Lynch, Field Crop Experimentalist, Wellington.

3. Two sprayings of ragwort over a period of months have given a high degree of control. Repeated applications to plants which have survived treatment and to root regrowths and seedlings in time give complete control.

4. Seedlings are more easily controlled than mature plants, and their root systems are less extensive, so that complete kills of plants are possible.

5. Spraying should not be delayed until shortly before seed setting because the action of the hormone material is slow and viable seed may be set if spraying is left too late. On the other hand, if mature plants have to be treated, the best results are obtained if spraying is carried out when the greatest amount of leaf is present. The greater the leaf surface covered by spray, the more hormone material is absorbed into the plant, and consequently the results of spraying are usually more drastic.

6. Hormone-type sprays at the recommended rates have been as effective as sodium chlorate applied as sprays or dusts at between 20 and 70lb. of sodium chlorate per acre, but dust applications of hormone type weedkillers have been less effective than sodium chlorate.

7. Showery weather after treatment considerably reduces the effectiveness of treatment, particularly by the water-based sprays. Preparations with an oil base are more resistant to unfavourable weather. Other things being equal, results are best in warm weather when plants are in active growth.

In no trial so far conducted has complete eradication of ragwort been secured with a single treatment of hormone-type weedkiller, but a satisfactory degree of control has been secured with spray applications of these materials.

Precautions when Spraying in Pastures

Heavy applications of hormone weedkillers can seriously damage pastures unless precautions are taken. That is especially true of oil-based materials, and several trials have resulted in considerable thinning out of clovers to the detriment of the sward. Nevertheless, these materials are much less severe on desirable pasture plants than sodium chlorate, and in this respect they show a decided advantage.

Young seedling pastures should never be treated with hormone weedkillers, as severe damage may be caused. Where ragwort plants can be "spot" treated little general pasture damage results, and this method is recommended for thin infestations of ragwort and particularly where the clovers in the sward are weak.

Advantages of Hormones

Provided reasonable precautions are taken, the hormone-type weedkillers applied as sprays at fairly-heavy rates give satisfactory control of ragwort, though complete eradication of an infestation of mature plants with a single treatment is most unlikely. These new materials can give as good results as sodium chlorate and do not have the disadvantages of fire risk and severe damage to desirable pasture species which are associated with that product.

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Subterranean Clover as a Cover Crop in Orchards

TRIALS with subterranean clover as a cover crop for orchards on Moutere Hills lands of the Nelson district give promise of great success. The need for cover cropping for soil improvement and arresting erosion is recognised. Blue lupins have been used almost exclusively in the past, but have not always given the results desired. In this article the experience with subterranean clover is described by N. J. Adamson, Horticultural Superintendent, and D. Merry, Instructor in Agriculture, both of the Department of Agriculture, Nelson.

ALMOST 2/3 of the area planted in apple orchards in the Nelson district is on the Moutere Hills, where the soil consists of a silt loam which is very deficient in organic matter. Its texture and its lack of organic matter make it peculiarly susceptible to erosion by water under clean cultivation. Throughout spring and summer orchards are subject to considerable water erosion unless special precautions are taken to minimise the danger. Winter rains also cause a good deal of surface washing unless the soil becomes protected by sufficient vegetation or suitable cover crops are grown.

Normally orchards are under clean cultivation from October to February inclusive. Standard practice is to sow a cover crop toward the end of January or early in February. Blue lupins have been used almost exclusively in the past and have proved their value as a soil improver when a good crop can be produced. In more recent years blue lupins have proved unreliable, more especially where they have been grown for a number of years, as many plants wilt and die through attack by the fungus *Sclerotinia sclerotiorum.* Even if good crops can be grown, the lupins do not cover the ground to protect it from washing as would subterranean clover, which spreads out over the soil in a thick sward. Oats have been used as a green crop by some orchardists when lupins have failed, but because of depleted fertility after clean cultivation oats too are often unsuccessful.

Subterranean clover has been used as an alternative with encouraging results, and from observations on several trial areas laid down by orchardists it would appear that a more satisfactory cover crop can be produced by using this variety of clover, which can be established on land of relatively-low fertility.

Establishing Subterranean Clover

Seed is sown in the first instance in late January or early February, up to 5lb. of subterranean clover seed per acre being used alone, or with 1 bushel of Italian ryegrass to provide additional quick cover and bulk of green material in the first season. Cultivation of the orchards normally ceases about February. Before the preparation of a good seed-bed in the final cultivation for the season, lime is applied at the rate of 1 ton or more per acre according to experience with lime treatment, and superphosphate is sown at the rate of 2cwt. per acre at sowing down. The clover or clover and ryegrass comes away with the first autumn rains, giving a complete cover to the ground throughout winter and spring. By early October the subterranean clover is running and flowering, and produces a dense sward by the end of that month, by which time seeding should have occurred. The clover is disced roughly in early November, and later disced in thoroughly, after which a good tilth is maintained until the end of January. With the first autumn rains after the cessation of cultivation, the clover, having been allowed to reseed, comes away strongly without the necessity for further sowing, and can be treated as a perennial.

This treatment means a departure from normal cultivation practice in that cultivation begins in early November instead of a month or 6 weeks earlier. It might be expected that the soil would dry out rather severely with late initial cultivation, that trees would suffer through

Heading photograph by A. R. Kingsford.

having to compete with the clover for soil moisture. and that the effect would be lack of growth and loss of tone in foliage. Little evidence of either restriction in growth or loss of tone in foliage has been observed, as usually in the Nelson district spring rains are sufficient to maintain adequate soil moisture. However, what is significant is the fact that fruit trees under this treatment finish the season in better heart than those under normal treatment of clean cultivation, because of the improved soil condition and nitrogen status.

Improvement of Soil Fertility

Samples of soil from an orchard at Tasman where good results had been obtained on a block of Cox's orange apple trees with subterranean clover sown between the trees showed substantial differences in both nitrate and ammonia nitrogen when tested by the Cawthron Institute. Soil samples down to 6in. deep were taken in January at a time when available nitrogen from the disced-in subterranean clover should have been in maximum supply.

The subterranean clover portion of the orchard gave 15.7 parts per million of nitrate nitrogen and 24.1 parts of ammonia nitrogen, compared with 4.6 parts per million of nitrate nitrogen and 7.2 parts of ammonia nitrogen on the cleanly-cultivated part of the orchard.

These figures show clearly the benefit in nitrogen status which has resulted from the sowing of subterranean clover, and warrant further trial of this clover in Nelson orchards. The improvement in soil structure and its organic content is very marked.

In contrast to the use of subterranean clover as an annual mulching crop, the growing of perennial strains of red and white clovers without cultivation has been tried under orchard conditions, but because of competition by the clover for fertiliser broadcast about the trees, and the considerable demand on soil moisture, the trees have rapidly declined in vigour and production. Up to the present only one variety of subterranean clover has been under trial—the Mount Barker mid-season variety. Though this type appears very suitable, further results may show that the later-maturing Tallarook, with its heavy leafage and seeding ability, can be included with advantage.

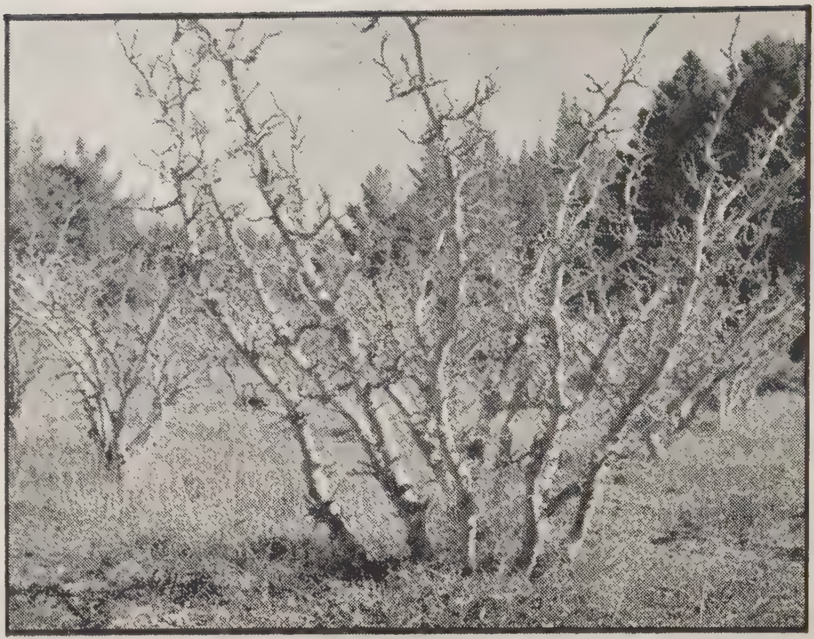
In Nelson, ryecorn is being used increasingly as a mulching crop after tobacco, and trials combining ryecorn with subterranean clover were to be sown in orchards at the end of the past season. Because of its quick growth and strong rooting ability, ryecorn has been very successful on the freer tobacco-growing soils, but its worth has yet to be determined on the Moutere clays.

When subterranean clover has become well established in an orchard it regenerates very well in the early autumn. The important factor in its successful establishment is not to work it in or damage it early in the first seeding year when it is overcoming the trials of establishment, often under rather low-fertility conditions. Results to date show very definitely the improvement in the colour, texture, and general soil fertility which follows the use of subterranean clover as an orchard mulch.

Lessening Soil Erosion

One of the main benefits to be derived from the growing of subterranean clover is a reduction of soil erosion by water. The soil's absorptive capacity is increased greatly, and under the changed practice the surface soil is protected for longer, as the period of clean cultivation is reduced to the few months of midsummer—from December until the clover begins to re-establish in March.

In addition, a complete covering of the ground is provided during winter and spring, when sharp, heavy falls of rain very quickly scour away topsoil, which either is lost or buries trees on lower slopes and valleys.



[*Ellis Dudgeon photo.*

A cover crop of subterranean clover reduces soil erosion by water. These trees at the mouth of a shallow depression have been silted up over the forks.

[*A. R. Kingsford photo.*

A close-up of a dense subterranean clover sward, photographed in October, which was sown between the trees in an apple orchard at Tasman, illustrated on the previous page.

Pampas Grass Production on Bay of Plenty Farm

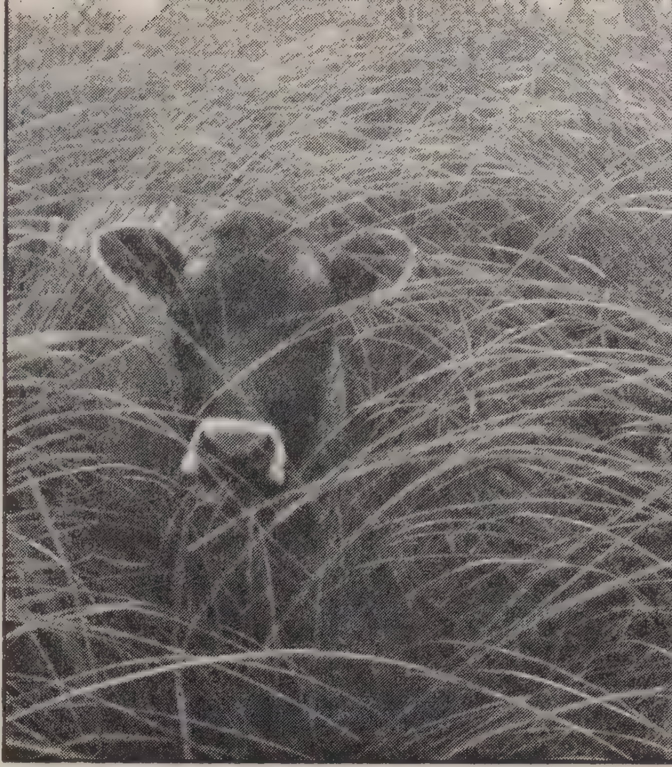
By A. V. ALLO, Instructor in Agriculture,
Department of Agriculture, Tauranga.

FEW crops grown in New Zealand today have aroused as much controversy as pampas grass. This is particularly so in the dairying districts of the North Island, where farming opinion varies from enthusiastic claims regarding the value of pampas grass to complete and utter condemnation of the crop. This article is intended not so much to advocate the growing of pampas grass as to give one farmer's experience with it and his opinion of its value.

THE farmer in question has a property of 147 acres in the Whakamarama district about 14 miles from Tauranga. The country, which is undulating to hilly, is about 500ft. above sea level and the soil is a light pumice loam, low in natural fertility. The farm when taken over by its present owner about 8 years ago carried 50 milking cows, producing 11,000lb. of butterfat, and 10 head of replacement stock. Today, without increasing the area of productive pasture, the carrying capacity is 57 cows, producing 15,000lb. of butterfat, 30 head of young stock, 2 bulls, 3 horses, 5 stud breeding sows, and 122 stud Southdowns. Making due allowance for the sheep and the increase in dry and replacement stock carried, it is reasonable to assess the increase in production in 8 years as equivalent to 7000lb. of butterfat. The farmer contends that much of the increased production can be attributed to the use of stands of pampas grass.

The farm now consists of 88 acres of dairy cow paddocks, 12 acres of pampas grass, 10 acres of plantation (on steep unploughable sidlings), 34 acres of sheep paddocks, and 3 acres devoted to pig layout, buildings, etc. Pastures are of only fair quality and require considerable improvement before they could be considered first-class dairy pastures, though there has been a measure of improvement during the time that the farmer has owned the property. This improvement, however, has been much less than desired, because fertiliser rationing has been in force during most of the time that the property has been in the hands of its present owner.

Five-year-old pampas grass stand put in straight after manuka. It established best where rough grass had been growing in the manuka. The thinner parts of the stand occur where manuka and blackberry were so dense that there was no grass. These latter patches have improved since a heavy dressing of cowyard manure was applied 2 years ago.



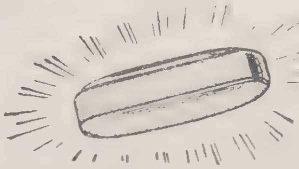
Cow grazing on 7-year-old pampas grass.

From the time he took over the property the farmer was interested in the possibilities of pampas grass. The farm was so broken that only certain paddocks were really suitable for being cut for hay and the owner realised that the continued cutting of hay on these paddocks would soon result in serious sward deterioration. At first the farmer decided to have sufficient pampas grass to enable him to reduce the area cut for hay, so that he could rotate his haymaking round the few suitable paddocks. As the pampas grass matured and its value became apparent the farmer increased the area, with the object, ultimately, of doing away with haymaking and of wintering stock solely on pampas grass. Today that aim has been realised. For the past 2 years only 2 acres of hay have been saved, and the season's cut was not needed for feed last winter—it was used for pig bedding.

The farmer's 12 acres of pampas grass is from 2 to 7 years old. There are 4 acres of 2-year-old (grazed last winter for the first time), 1½ acres of 3-year-old, 2½ acres of 4-year-old, 3 acres of 5-year-old, and 1 acre of 7-year-old. Blocks are scattered over the farm, 9½ acres being on good country and the balance on a poor sidling. All the pampas grass has been planted out on cultivated land, 4 acres after maize, 2½ acres after manuka, and the balance on land ploughed out of pasture. Planting has been done in spring, in rows 6ft. apart, with 6ft. spacing between plants. Except for the patch put in after manuka, no manure has been applied to the pampas grass stands at any stage.

For the earlier-planted areas the farmer purchased 7000 plants from outside sources, but he raised his own plants for later plantings by taking cuttings from the established stands and planting them out in a nursery. Cuttings were placed in a permanent site after 1 or 2 years, depending on their stage of growth. The farmer now believes that he would have been wiser had he purchased all his plants, as those he reared were not as vigorous as those he bought. One patch of 3 acres was interplanted with maize and the practice gave good results; the maize crop was good and the pampas grass benefited from the manuring and cultivation given to the maize. Very little cultivation was given to other pampas grass stands.

For some years the farmer has cut roadside cocksfoot for seed. After the cocksfoot has been threshed and sieved the best seed has been sold, while the seconds, with 3lb. of white clover per acre, have been sown on the pampas grass areas. As a result there is now quite a fair sward between the pampas grass rows, which not only



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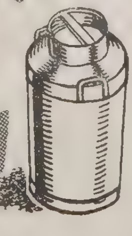

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CHEESE RECIPES

helps to increase the bulk and quality of the feed produced from the areas, but also binds the soil between the rows, thus avoiding pugging during winter feeding off. Every summer over the past 3 years cocksfoot seed has been harvested from about 5 acres of the pampas grass areas, more than 300lb. of seed being sold last year for a gross return of £20. It takes 24 hours to cut the seed and 18 hours to thresh and sieve it, which, at a labour charge of 3s. 2d. per hour, means that it costs £7 to gather the seed, leaving a net profit of £13.

A new stand of pampas grass is grazed according to its rate of growth and stage of development. If establishment and growth are good, a light grazing is given at the end of 12 months; otherwise the stand is not touched for 2 years.

Seven-year-old pampas grass after 10 days' grazing.

Establishment

Establishment was good on all areas except the 2½ acres on which manuka and blackberry had been growing. This area was cleared and burnt and, after being cultivated, was planted in pampas grass. Establishment was very patchy; it was good on level parts of the paddock on which there had been a certain amount of grass growth among the manuka, but on the sidlings and where there had been only fern, manuka, and blackberry, growth was very slow and plants were stunted. Later the farmer was advised to apply a good dressing of shed manure to the stunted plants, which have shown an excellent response and are now coming away quite well.

As they mature all pampas grass areas are subdivided into ½-acre blocks with permanent 3-wire fences. This prevents considerable waste and ensures that blocks are eaten up quickly and evenly. Though the capital outlay in permanently subdividing the pampas grass into ½-acre blocks is greater than the cost of fencing haystacks and silage pits, it must be realised that this first cost is also a last cost, whereas the fencing of stacks, pits, etc., is an annual charge. Thus it is felt that over a 10-year period one cost would balance the other, especially if the cost of dismantling stack fences, digging silage pits, and covering silage with earth is taken into consideration. Including permanent farm fences not affected by the growing of pampas grass it is estimated that the subdivision of the pampas grass area has involved 66 chains of fencing.

Utilisation

When winter approaches and supplementary feeding becomes essential the distant stands are grazed first. As the cows approach calving they are brought in to the handy stands (5½ acres are within 200 yards of the shed), which, in addition to providing supplementary fodder, give the herd excellent shelter in which to calve.

It has been found that each ½-acre of mature pampas grass will provide feed for 80 head of cattle for 10 days in winter. Every patch has a run-off paddock available, on which growth is allowed to get away for a week or two before the paddock is stocked. With such a large proportion of young pampas grass on the farm, and taking into account that 2½ acres are on a rather poor manuka sidling, it should be obvious that the concentration of stocking just described is not possible at present on the whole 12 acres of pampas grass. However, when all the pampas grass comes into full production, the farmer aims to have improved his pastures to the extent that a bigger herd can be milked so that all the pampas grass can be used.

In March each ½-acre block is grazed for 3 to 4 nights. Stock will clean up the flower heads, which they eat with relish, and pastures are given a welcome spell while the herd is on the pampas grass.

On this farm there has never been any trouble in getting stock to eat pampas grass; the author saw the herd eating pampas grass with obvious relish despite the fact that there was a good picking of grass on the run-off paddock.

Two-year-old stand (planted after maize) after grazing. There has been excellent utilisation of the fodder.

PAMPAS GRASS . . .

Briefly, then, this is one farmer's experience with pampas grass. The first year on his farm he cut 40 acres for hay and silage; he does not intend cutting any in future. His production figures have increased considerably over 8 years and the stock are in reasonable condition. The farmer is well satisfied with the results he has had from pampas grass, and though he appreciates the fact that an area of lucerne would give superior results in yield of high-quality food value per acre, he feels that pampas grass provides fewer problems in management and overhead expenses on the class of country he is farming.

The farmer favours pampas for the following reasons:

1. During winter the herd is not kept hungry in the morning while waiting for the farmer to feed out. The unpleasant task of feeding out on Sundays and in wet and stormy weather is eliminated. (The farmer considers that his pampas grass has a feed value at least as good as much of the poor-quality hay fed to dairy stock on many farms.)

2. Because no harvesting or feeding out is done, more time is available for other farm work.

3. The farmer is independent of the weather. He is not worried by a wet summer.

4. Pampas grass provides a safeguard against drought and facial eczema.

5. Though the pampas grass has to be fenced in ½-acre blocks, fencing is permanent; on the other hand, fencing of stacks and silage pits has to be done every year.

6. On his farm, which has a limited number of paddocks sufficiently level to cut for hay, the feed supplied by pampas grass makes the cutting of the same paddock year after year, with consequent sward deterioration, unnecessary.

The farmer insists that pampas grass demands reasonable conditions of soil fertility and quotes as an example his experiences with pampas grass on the area that had been in manuka. He feels that it is useless to plant pampas grass on infertile or weedy ground.

The Whakamarama district is subject to severe grass-grub attack in autumn, with consequent serious effects on pasture production. Pampas grass gives the farmer a reserve of feed that will enable him to weather an attack until such time as pastures can be brought back into production.

◆

Gestation Table

	Days *		Days *
Mare	340	Sow	116
Cow	283	Bitch	63
Ewe	150	Rabbit	28-30
Goat	150	Ferret	40-44

* From date of service.

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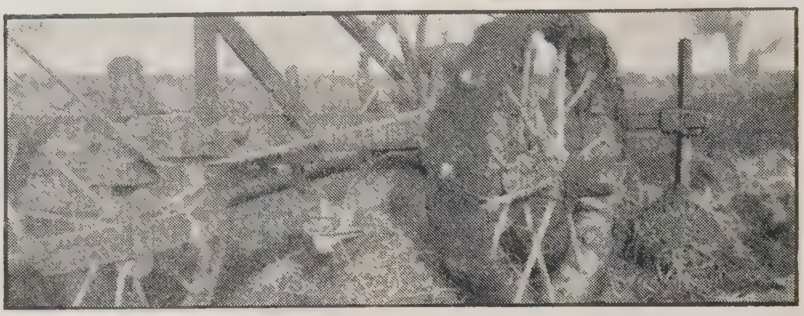
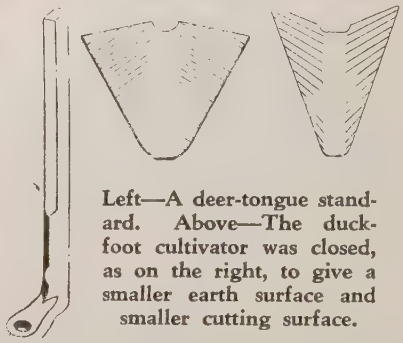
Attachment for Ploughing in Straw Manure



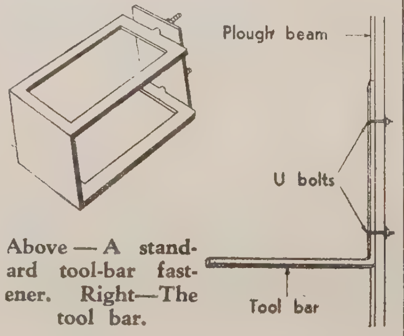
IN the market gardening area on the outskirts of Christchurch some of the occupiers use considerable quantities of manure obtained from racing stables in the district. This manure also contains straw which had been used to bed down horses, and consequently when it is spread on the ground difficulty has been experienced in ploughing it under and leaving a ploughed field without any material on the surface.

THE practice has been to open up the first furrow of land and for 1 or 2 men to fork the manure and straw mixture into the furrow to clear the way for a free run for the next furrow, and so on over the field.

A market gardener in the Papanui district who ploughs under from 18 to 24 tons of stable manure and straw mixture per acre yearly has overcome the difficulty by adding a small attachment to his plough which enables the mixture to be buried. The attachment consists of a tool bar, 2 U bolts, a standard fastener, a deer-tongue standard, and a duck-foot cultivator. The tool bar was made from a 6ft. length of 1in.-square steel bent in the centre to form an L and attached to the beam of the plough so that it projected toward the land side of the plough. The duck-foot cultivator was closed to give it a smaller cutting surface and smaller earth surface, this cultivator then being attached to a deer-tongue standard. The standard is set so that when the plough is tripped and operating it penetrates the soil to a depth of about 2in. directly in line with the next furrow to be ploughed. It cuts a narrow line through the straw and manure mixture, throwing the mixture to either side, and a clean strip is left down which the skeath blade can run without any obstruction caused by the mixture becoming caught in the beam of the plough.



Left—A deer-tongue standard. Above—The duck-foot cultivator was closed, as on the right, to give a smaller earth surface and smaller cutting surface.



Above — A standard tool-bar fastener. Right—The tool bar.

—J. F. RANDELL, *Investigating Officer, Department of Agriculture, Christchurch.*

Upper—The plough in operation with the attachment cutting a line through the straw and manure. Lower—Portion of the ploughed and unploughed areas.

Sheep Dosed with Minerals Eat as Much Lick as Undosed Animals

By I. J. CUNNINGHAM, Superintendent, Department of Agriculture
Animal Research Station, Wallaceville.

MOST stock men accept as an article of faith that if animals eat mineral licks, they must need the minerals. The appetite of the animal is regarded as the final answer, the only test. The falsity of this view has been pointed out by the author on many occasions—in articles in this "Journal" (January, 1947) and in "The New Zealand Dairy Exporter" (January, 1947, and November, 1947), in addresses to farmers' meetings, and in discussions and conversations.

IT has been shown that, except for areas where copper, cobalt, or iodine is deficient, most New Zealand pastures contain sufficient minerals and animals do not need any extra; it has been shown that some of the animals deficient in one of the trace minerals mentioned will not eat it when it is offered in a lick; it has been shown that animals will eat poisonous minerals like lead battery plates which they cannot possibly need. In fine, the appetite of the animal is no guide to its needs.

Despite this there is very often a reservation in the mind of the stock owner to the effect that if a mineral lick is eaten, it supplies something that is deficient in the animal's diet. The belief, curiously enough, is restricted to mineral licks; it does not extend to the tractor seats sometimes reported to have been eaten, to the clothing that calves eat off the Monday morning washing line, or to the paint that is licked from a derelict shed. The belief very clearly needs some examination by the stock owner.

A simple experiment recently carried out at Wallaceville might be of some help in this examination. In this experiment 2 groups of 5 sheep each were run in separate paddocks which were side by side and closely similar. Both groups of sheep were provided with the same palatable lick in the same design of lick box. In 1 group each sheep was given daily through a stomach tube 10 grammes (about 1/3oz.) of the lick suspended in about a pint of water. In the second group, for purposes of uniformity, each animal was dosed in the same way with a pint of water only. Thus 2 similar groups of sheep, on similar paddocks with similar pasture, each had equal opportunity to eat a mineral lick, but the sheep in 1 group had minerals from the lick put inside them each day.

Supply does not Affect Appetite

The total amount of the lick eaten by each group was measured for 4 months from March to July, 1948. During this period the sheep which were dosed with the lick ate an average of 4.7 grammes of the lick each per day (30 grammes = 1oz.); the sheep dosed with water ate 3.8 grammes each per day. In other words, the sheep which were dosed with the lick and which got minerals from the dose ate more from the lick box than the other lot of sheep which did not get the daily dose of minerals. If sheep eat mineral licks because they need the minerals, the results should have been very different. The sheep which had only water in the daily dose should have eaten at least 10 grammes more than their fellows in the other group. There can be no other conclusion than that the supply of minerals had no effect on the appetite for minerals.

Another interesting feature of the lick consumption was that the amount eaten varied somewhat from week to week. For a fortnight at the beginning of May grass was rather short and at this time the amount of lick eaten increased, but it increased equally in both groups. Right through the experiment, in fact, the variation in the amount of lick eaten in the 2 groups was exactly similar: It went up when feed was short; it dropped when more feed grew. The extra lick dosed to the 1 group made no difference whatever to the amount they ate at the lick box.

This was a small experiment, but it has a definite significance. It shows that the animals in this experiment did not visit the lick box because they needed the minerals. It suggests that animals do not need the licks they eat but eat them because they like them.

BOOK REVIEW

THE NUTRITION OF FARM ANIMALS IN NEW ZEALAND: by F.H.

THIS is a curious mixture of truth, half truth, and untruth. The author refers to a number of recognised authorities, but his method of quoting from their publications is more ingenious than illuminating. Space will not permit a complete sifting of fact from fiction, but attention must be drawn to some of the more glaring inaccuracies.

ON page 31 the nutritive requirements of a cow yielding 4 gallons of milk at her peak are graphically compared with her daily intake from pasture, and it is suggested that intake will be inadequate from early October to the end of January, but more than sufficient in September, February, and March. This is, of course, contrary to both research findings and farmers' experience. Dairy cows nearly all lose weight in early spring, but from the end of October even high producers tend to gain weight when fed on good pasture.

Manganese

On page 45 it is stated: "At the present time we are without really precise knowledge as to the daily requirements of manganese by the various farm animals, but since its great importance in reproduction has been established, it has become common practice in overseas countries to include this element in supplementary mineral mixtures."

Professor E. J. Underwood, one of the leading authorities on trace elements, says in the "Journal of Agriculture of Western Australia," volume 24, December, 1947, page 259: "Manganese appears to be of little practical importance in the diet of mammals because their requirements are exceedingly small and the amounts supplied by ordinary foods are invariably greater than the animals' requirements. No naturally occurring deficiencies of this mineral have so far been recorded for grazing animals."

Animal Instinct

On page 51 is a paragraph dealing with the "instinct which enables animals to balance up their food intake, with respect to its several nutrient and mineral components," and the statement is made that "Most scientific authorities consider that if a mineral mixture is made available to animals they will consume it when and if they require it; if not, they will leave it alone."

An interesting experiment which is recorded by I. J. Cunningham on this page will be found quite illuminating on this subject.

Phosphorus in Pastures

On page 53 is a graph which purports to show that a dairy cow producing 3 gallons of milk at the peak of the season's production would not obtain her phosphorus requirements from an average pasture from the end of November to the middle of March. This graph is based on data taken from Bulletin No. 31, New Zealand Department of Scientific and Industrial Research, pages 118 and 119. However, it is not indicated that the pasture in question had not received any phosphatic fertiliser after July, 1926, over 4 years before the start of the period shown in the graph. A statement on page 54 of the booklet that "During the 3 years prior to the trial the pasture had received a total of 4cwt. superphosphate" is incorrect.

To give a true picture of the results obtained in this trial the amount of P_2O_5 available in 25lb. of dry matter has been estimated both for the untopdressed pasture and for the pasture which received a total of 11cwt. of superphosphate per acre between August, 1929, and January, 1932. The results are shown in the following table, together with figures taken from the graph in the booklet, which are shown in heavy type:—

PHOSPHORUS BALANCE SHEET FOR A DAIRY COW YIELDING 3 GALLONS AT PEAK OF PRODUCTION

Date	P_2O_5 in 25lb. of dry matter from untopdressed pasture (grammes)	P_2O_5 in 25lb. of dry matter from topdressed pasture (grammes)	Requirements (grammes)
28/11 and 11/12/30	86.2	106.6	
1 and 22/12/31 ..	96.4	113.4	
November 27 ..	**86**		**87**
24/12/30 and 5/1/31	65.8	80.5	
14/1/32	73.7	98.7	
December 22 ..	**66**		**83**
29/1 and 20/2/31 ..	71.4	90.7	
January 28	**71**		**74**
26/3/31	60.1	76.0	
3/3/32	90.7	115.3	
November 9	**61**		**67**

Where two dates are shown the pasture cut on those dates was bulked for analysis. Now, though the dates given by F. H. do not coincide with those in the original and no year is stated, obviously he has selected figures from the untopdressed pasture for the seasons 1930 and 1931. Throughout the booklet the figures for phosphorus requirements are too high, but even if they are accepted, it will be seen that the cow's requirements are amply met by the topdressed pasture.

On page 69 it is stated: "In the published reports of pasture research work carried out in New Zealand we find many examples which illustrate that topdressing with phosphatic manures cannot be depended upon to increase the phosphate content of pastures to any marked extent." From these the author selects as a typical instance Bulletin No. 31, Department of Scientific and Industrial Research. The table quoted previously is based on data from this bulletin, and on page 67 its authors have this to say: "The influence of the superphosphate on P_2O_5 content of the herbage is very marked; without exception the herbage from the no-phosphate treatment (treatment 1) contains less P_2O_5 than any other treatment for every cut in the period under consideration."

Typical Dairy Pasture

The author's lack of appreciation of the value of New Zealand pastures is well illustrated in the paragraph on page 62 headed "Research on Typical Dairying Pasture," which contains a reference to some valuable experiments conducted by the Cawthron Institute on pasture laid down about 1883. Its total production was about 4500lb. of dry matter per year.

This probably was a typical dairy pasture 26 years ago when the experiments were begun, but it would be regarded as a very poor pasture now, when an average dairy pasture produces 6000lb. of dry matter and good dairy pastures produce 10,000lb. or even more.

Iron

In dealing with iron the author is quaintly naive. On page 55 he gives a table based on analyses reported in Department of Scientific and Industrial Research Bulletin No. 32. These were made on a pasture concerning which the authors of the bulletin say: "Sheep thrive and make rapid development. No serious stock ailment has been noted in connection with the stock industry on this soil type." However, by the adoption of the ridiculous standard of 2 grammes of iron for the daily maintenance requirements of a cow the table seeks to show that cows grazing this pasture would be seriously deficient in iron. The authors of the bulletin were investigating "bush sickness," which at that time (1930) was believed by some to be caused by iron deficiency. Though they found that the "bush-sick" pastures had less iron than the healthy ones, they made this comment: "The difference in iron content is not nearly as great as might have been anticipated if it be assumed that the cause of Glenhope ailment is iron deficiency."

Their suggestion that iron content did not cause "bush sickness" has, of course, been confirmed, and it has been demonstrated both in New Zealand and Australia that dairy cattle can thrive and produce at high levels with an iron intake even lower than those quoted in the table on page 55 of the booklet.

Coal-tar Derivatives and Penicillin B

On pages 89 and 90 there is a reference to a coal-tar drug which is the active principle in a stock remedy for mastitis, and it is stated that "When investigation of some of the antibacterial substances produced by moulds was conducted upon a worldwide scale the important fact emerged that this coal-tar drug was identical in its chemical structure with penicillin B." In Note II of the appendix it is indicated that penicidin, notatin, and penatin are identical with pencillin B.

The facts are: The mould products penatin, notatin, and penicillin B are generally regarded as being closely related to one another, if not identical. They are all protein in nature and can have no possible relationship to coal-tar derivatives. The substance penicidin is also complex and may or may not be identical with the mould products mentioned, but very little is known about its chemistry. It is hard to understand what the author hopes to achieve by such an absurd distortion of readily-available scientific knowledge.

It is not possible in a review of this nature to deal exhaustively with all of the inaccuracies with which this booklet abounds, but perhaps enough has been said to induce stock owners to regard with suspicion any of its conclusions and recommendations which are at variance with the findings of reputable, disinterested scientists.

—*J.F.F.*

Published by Wonder Distributors Ltd., Feilding.

Education Service for Rural Communities in Auckland Province

FOR people interested in widening their knowledge through reading, study, and discussion, the Auckland Adult Education Centre recently announced its services for the country areas of Auckland Province for 1949. The aim of the service is to give country residents an opportunity for enriching their lives through a wide variety of educational, cultural, and recreational activities.

SUCH subjects as literature, economics, psychology, science, international affairs, and interior decoration are included in the discussion courses. Music, drama, and painting are catered for by box courses, groups studying these topics being supplied with boxes of material—sheet music, gramophone records, play sets, and art reproductions. The centre also arranges public lectures in country towns by drawing on local experts, supplemented by the Auckland University College staff and the centre's own tutors.

The centre offers all its services to any club or organisation seeking educational aid or planning an educational programme. Community weeks in country towns, where a week is given over to educational, recreational, and cultural activities, have been successfully planned and carried out jointly by the centre and local committees. Where 16-millimetre sound projectors exist local film societies have been assisted, and both documentary and feature films are available free of charge from the National Film Library to any properly-constituted film society. Women tutors are also available for lecture tours of women's organisations, and a women's winter school is held for a week in Auckland during the first-term vacation.

The centre stresses that it is only a servicing agent and that the initial request for assistance must come from local communities or from individuals. All inquiries should be addressed to

The Adult Education Centre,
Symonds Street,
Auckland.

BOOK REVIEW

"The Production of Field Crops:" T. B. Hutcheson, T. K. Wolfe, and M. S. Kipps

A TEXT-BOOK on agronomy based on farm practices in the United States of America, this book covers general principles as well as details of production for individual annual crops and includes sections on pasture production and management. As conditions and farm practices are so different in New Zealand and the United States, the book is likely to claim here the attention of only students of agronomy and economic geography, who will find it a useful and well-illustrated text-book.

—*P.W.S.*

McGraw-Hill Book Co., Inc., New York.

ANNUAL CROPS FOR PIG FEEDING

SEASONAL NOTES Contributed by the EXTENSION DIVISION

PLANS should now be made for annual crop production for next season, and dairy farmers may well give careful consideration to the provision of crops for pig feeding, especially for winter feeding. Without special crops to supplement separated milk, buttermilk, or whey, it is very difficult to balance the number of pigs with the seasonal supply of dairy by-products, for there are periods in the late autumn and spring when these are often not available in sufficient quantity for fattening pigs, and in the winter when the herd is dry sows and autumn-born litters still have to be provided with feed.

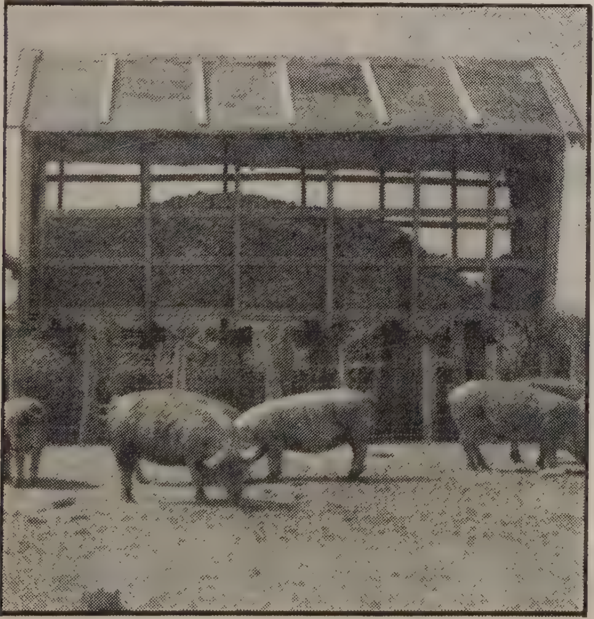
IN most dairying districts suitable crops such as mangolds, pumpkins, sugar beet, carrots, swedes, and artichokes can be grown, and if these are fed with a protein-rich concentrate (such as meat meal), they will provide part of the ration for fattening pigs and a suitable ration for wintering stores.

The area of roots required for wintering pigs on the average dairy farm does not call for a great deal of labour. Two tons of roots will winter a sow for 3 months and ½ ton of roots will winter a store pig for the same period. A 30-ton crop of roots will thus provide (with the addition of the necessary meat meal) for the wintering of 5 sows and 40 store pigs.

In North Auckland, Bay of Plenty, and east coast districts maize is the most suitable cereal to produce for pig feeding; it may be used to supplement separated milk in the early spring and late autumn and with meat meal makes a suitable winter ration for store pigs.

Young pigs should be brought gradually on to a winter ration of roots, and young stores should not be brought to a full ration until they are 3 to 4 months' old, or at least 55lb. liveweight, and until then they should receive a sufficient ration of separated milk and meal. Swedes are rather hard, but where swedes can be grown carrots can also, and young pigs should be started on carrots if possible.

Where the land has previously been in crop or is lying fallow it should be ploughed deep, but if it is in grass it should be skim-ploughed or the turf disintegrated by surface workings with suitable implements, such as discs. If skimmed, the soil should be left undisturbed for a few weeks, then disced to pulverise the turf, and then deep ploughed. If the turf is not skim-ploughed or disced, but only deep ploughed, the inverted sod will require repeated deep discings in early spring when the soil is in a fit condition. If no skimming is done and the soil is light and friable, it will need rolling in the furrow before discing.



MAIZE.—In the warmer northern districts maize may be used to supplement separated milk in early spring and late autumn, and with meat meal it makes a suitable winter ration for store pigs.

SUGAR BEET.—Sugar beet is one of the most suitable root crops to provide for the supplementary feeding of pigs in autumn, when supplies of separated milk are falling, and for wintering sows and store pigs.

In all cases after deep ploughing the land should be left undisturbed until the soil is sufficiently dry in the spring for subsequent cultivation. On heavy soils, if ploughing has been carried out early enough, sufficient consolidation may be obtained without using the roller. With light soils, however, rolling on the furrow is necessary and should be repeated after the soil has been worked down before and after sowing, particularly if small seeds are sown.

The degree of fineness to be achieved by use of discs, cultivators, and harrows depends on the kind of crop to be sown. Crops with small seeds, such as swedes, carrots, and particularly beet and mangolds, require a very fine and firm seed-bed, whereas grain crops and crops belonging to the pumpkin family can be grown successfully on a seed-bed where the soil, although firm and fine below, is fairly lumpy on the surface. For artichokes the soil requires cultivation to a fine, deep tilth. If difficulty is experienced in making the soil fine by surface workings, it will be found that the desired condition can be readily attained after reploughing.

On heavy land special attention should be paid to the state of the soil before cultivation is carried out. If the soil is too wet, cultivation will produce harmful results; if it is too dry, cultivation will not be effective. It is usually better to delay sowing until the desired tilth is obtained rather than to sow on time on a poorly-prepared seed-bed.

Fodder crops do best after pasture or as a second crop following pasture, but the farmer should avoid sowing crops after previous crops of the same family. Chou moellier and root crops suitably follow cereal crops or potatoes, while spring-sown cereals suitably follow roots and potatoes. New areas for crops should be chosen when the area becomes weed-infested or the soil loses fertility.

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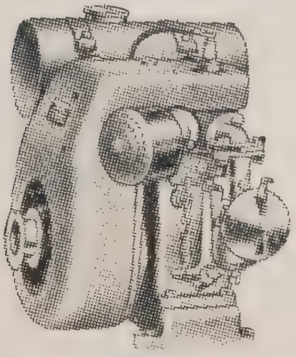

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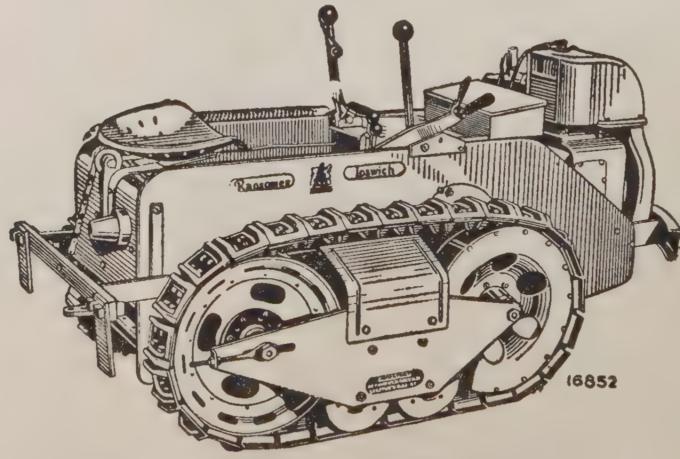

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SURVEY OF RASPBERRY GROWING IN NELSON

Cost of Production 10.55d. per lb. in Motueka, 10.44d. in Tapawera

COST-OF-PRODUCTION surveys serve the dual purposes of assessing broadly the common costs of production and of summarising production methods as a basis for subsequent work aimed at raising the general level of efficiency to that of the most progressive growers. This summary of raspberry production costs deals only with the assessed costs of production in the Nelson district and is published to provide growers and instructors with the basic data necessary for formulating further investigational work to secure increased efficiency.

THE Nelson Raspberry Marketing Committee requested the Department of Agriculture to undertake a survey of the raspberry-growing industry in that area to determine the incidence of costs. Field officers of the Extension Division, assisted by officers of the Horticulture Division, gathered information from a panel of growers nominated by a joint committee of growers and departmental officers, and this report was compiled by A. N. Headifen, formerly of the statistical section, Extension Division, Department of Agriculture.

While the Nelson district was concentrated on, data were also collected from other raspberry-growing areas in New Zealand, but on a less comprehensive scale. This procedure was adopted to provide comparative data about operational practices and methods of production. Some worthwhile information was obtained from these other areas, but only that assembled in Nelson was sufficient to provide the accuracy required for a project of this nature.

The district distribution of gardens in the 1945-46 and 1947-48 seasons was:—

AREAS IN RASPBERRIES IN NEW ZEALAND, SEASONS 1945-46 AND 1947-48 *

	Area		Percentage of total	
	1945-46 (acres)	1947-48 (acres)	1945-46	1947-48
Hawke's Bay	4	80	0.67	11.54
Wairarapa ..	45	58	7.50	8.37
Manawatu ..	18	30	3.00	4.33
Nelson ..	186	196	31.00	28.28
Canterbury ..	290	257	48.33	37.09
Otago ..	32	32	5.33	4.62
Otago Central	25	35	4.17	5.05
Others ..		5		0.72
Total ..	600	693	100.00	100.00

* Horticulture Division data.

Areas have tended to increase in all districts except Canterbury, where there has been a slight decrease. However, there is evidence that this decline was only temporary and that the area in the coming season will approach or even surpass the previous peak.

The most remarkable increase has been in Hawke's Bay, where the area has been increased by large plantings for a commercial canning firm. Small areas have also been planted by returned servicemen with Rehabilitation Department assistance and by orchardists as a sideline. In most cases plantings of the latter type have been made to augment incomes while pip and stone fruit orchards are being brought to the bearing stage.

Nelson as Measuring Stick

It was considered at the outset that several factors combine to suggest that Nelson can be used as a measuring stick to determine the common costs of production. These are:—

- The remoteness of the gardens precludes any great possibility of gate sales, and the growers therefore depend on the actual ceiling prices for their returns.
- Raspberries provide about half of the total farm income of the growers surveyed. The industry is not treated as a sideline in the majority of cases, and growers are vitally concerned with the future of their product.
- The industry is more stable in Nelson than in other parts of the Dominion. The area in raspberries and the identity of growers have remained more or less constant for a period of years, ensuring a greater degree of accuracy in the survey of this area.
- The successful production of raspberries demands certain well-defined climatic characteristics. Nelson is particularly well served in this respect, and for this reason the industry can be conducted on more uniform and economic lines there than in other districts.
- Preliminary investigations of the other districts tended to show that the results of analysis of the cost schedules could be no more than indicative because of the recent plantings, instability of areas and identities of growers, inadequacy of data supplied, and small size of the sample available.

Influence of Climate

Climate is perhaps the dominating factor in successful raspberry growing, and because of this factor the industry has tended to be located primarily in the South Island. A cold, dry winter, a warm summer, and an evenly-distributed rainfall are ideal for raspberry production. An early onset of cold weather, accompanied by relatively-little rainfall, allows a good rooting system to develop, as it discourages sucker growth. Excessively-wet conditions and poor drainage are conducive to root-rot fungus and consequent loss of canes. A warm, comparatively-moist summer is ideal for the full development of good fruit, and lack of such conditions is responsible for the installation of costly irrigation schemes in certain areas.

[National Publicity Studios photo.

The Nelson climate is ideal in all respects and the industry has been established there for many years without the need for irrigation. In addition, growers in this district are old established and therefore capable of providing detailed and accurate information of the nature required to complete a survey.

Farming Conditions

The district controlled by the Nelson Raspberry Marketing Committee is divided into 2 wards, the area around Motueka and the area around Tapawera. Even in this district methods and practices vary greatly between the 2 wards, and they will be presented separately in the analysis of cost incidence.

Motueka: As most production is for sale to the local factory, the location of raspberry gardens is not dictated by considerations of ready access to retail markets or the possibility of roadside sales, but is based rather on the suitability of soil types. Thus the gardens are widely scattered throughout the district, from Riwaka and Umukuri to

Ngatimoti and Upper Moutere, wherever soils are suitable. The most favoured positions are on the alluvial, silty loam of the river valleys, where drainage is simple or unnecessary. Some gardens are established on gently-sloping hillsides or on similar easily-worked light loam. A few small plantings are on first-class tobacco, hop, or orchard land, but these are more in the nature of a catch crop as a sideline to other major enterprises.

Tapawera: This district is too remote to have dealings with the retail market or to dispose of any produce to passing motorists, and therefore must confine itself to the wholesale bucket trade and factory supply. The typical farm in this area consists of relatively-large holdings of hilly, unproductive land with small areas of cultivated land at the feet of the hills and in the narrow valleys. The soils on the higher country are naturally poor, and raspberry production therefore is restricted to the lower slopes and valleys. In consequence the gardens are small and irregular in shape, with frequent need for protective works against flood damage and wash. The gardens in the main are established on free-draining, alluvial, silty loam varying from 8in. to 3ft. deep, with a heavy layer of shingle underneath.

Farm Sizes and Types

Motueka: In almost all cases a considerable area of poor hill country is held in conjunction with the cropped area. This land, which averaged 131 acres per holding on those visited, is either grazed by a few store sheep or left in scrub, while the better portions closer to the flats are used for grazing work horses and house cows. Of the average area of 12 acres cropped, 2.75 acres are in raspberry gardens and the remainder mainly in tobacco, hops, or small fruits.

Tapawera: The development of the type of farming practised in Motueka is carried even further in Tapawera. The hills are almost wholly unproductive, being very steep with poor soil, with the result that most have remained in or have reverted to scrub. The average size of the holdings is 340 acres. A few sheep are run on the hills, and the average area in cultivation is 6½ acres in raspberries and a similar area in such crops as potatoes or turnips.

The area in raspberries on the 23 holdings surveyed in Nelson was 111 acres, representing 56 per cent. of the total area in raspberries in the district. This is considered a particularly-good sample, and care was taken that the growers in the panel were a representative cross-section of the whole.

The area in crops on the holdings included in the survey totalled 246 acres, consisting of 32 acres of market garden, 22 acres of orchard, 8 acres of small fruits, 111 acres of raspberries, and 73 acres of hops, tobacco, and fodder crops. Thus 45 per cent. of the area cropped was in raspberries, and it is estimated that at least 50 per cent. of the income of this group was derived from this source.

ESTABLISHMENT COSTS

It has been necessary to calculate the cost of establishment of a garden in order that a portion of this initial outlay may be charged against a normal year's production. From the information supplied by growers it was possible to detail accurately the operations and materials used in establishment and compute costs accordingly.

It is generally accepted that the productive life of a raspberry garden is 12 years, and each of these 12 harvests must bear an equal share of the costs of establishing the garden. Normally, canes produced in the first year of establishment are cut down fairly hard, so that there is relatively-little fruiting in the second year and the few berries which may be produced are of little consequence and are seldom gathered. If canes are treated in this manner, the necessity for removal of berries to promote healthy growth is avoided and hardy plants are developed for subsequent years.

Therefore it is necessary to class as establishment costs all items incurred up to the time the yearly cultivation cycle begins for the first season of a full harvest. This has been taken as the third year after the initial plantings.

The table below gives a summary of establishment costs for each district.

Labour

The total cost for productive labour during establishment in Tapawera is more than 50 per cent. greater than that spent in Motueka.

The first marked variation is in the time taken for planting. In Motueka a horse and 1-furrow plough are used to run out furrows in which the canes are planted. It is then relatively simple to mark out the distances between stools (clumps of canes) and to plant. This would appear a much more economic method of planting than that employed at Tapawera, where spacings are hand measured, holes are hand dug, and the canes are hand planted, almost doubling the time taken for the work. In Motueka growers in general do not cultivate to level, but plough on and off during the first year. These ploughing operations are reflected in a shorter time spent hand grubbing weeds, as ploughing on to the canes retards weed growth.

COST OF ESTABLISHING 1 ACRE OF RASPBERRIES AT MOTUEKA AND TAPAWERA

	MOTUEKA		TAPAWERA	
	Cost (s.)	Percentage of total	Cost (s.)	Percentage of total
Labour	793	35.22	1,245	46.67
Motive power	108	4.81	166	6.21
Materials	795	35.30	723	27.10
Cartage	49	2.19	46	1.72
Interest, depreciation, and maintenance	81	3.59	75	2.83
Overhead	310	13.76	328	12.32
Rent and rates	116	5.13	84	3.15
Total	2,252	100.00	2,667	100.00

Inter-row cultivation is done regularly during the growing period, but the time for each stroke is doubled in the Tapawera district, mainly because of the cross-cultivation allowed by the planting system favoured there. Stools are planted on the square, usually 6ft. by 6ft., thus allowing cultivation in both directions, the whole operation being called 1 stroke. In addition, a 5- or 7-tine cultivator is used in Tapawera, whereas the wider, spring-tooth cultivator used at Motueka enables the area to be covered more quickly.

Topping, pruning, tying, and carting off are relatively-short operations at the end of the first year, as canes are still small. When ploughing off in the second year, several Tapawera growers also cross-plough to break up the ground more effectively for subsequent cultivation. The difference in cultivation times and methods persists throughout later years in the 2 districts.

Time devoted to hand grubbing again shows a variance. In Motueka, growers whose gardens are on the heavier loams of river flats are troubled more by weed growth than those cultivating the lighter hill soil. In Tapawera all growers have bad weed trouble on the river flats and show more hours for this type of work.

The gardens of Motueka, being smaller, are usually worked by the grower himself up to harvesting time, whereas in Tapawera, though the owner still does most of the work, a considerable amount is done by permanent labourers.

Tractors and Horses

Though tractors are used by some growers who at the same time are operating other large farming interests, most of the raspberry gardens in the Motueka area are still worked by horses. The same applies to Tapawera, though smaller types of tractors are gaining in popularity, even among farmers whose main interest is raspberry growing.

Horses have been taken as the type of motive power throughout, and they are likely to persist on the average smaller farms which have insufficient work for the economic use of a tractor. Though costings using a horse as the unit weight down the cost per hour against the tractor users, this is counterbalanced to a large extent by the longer working times taken by horses and the accompanying longer labour hours.

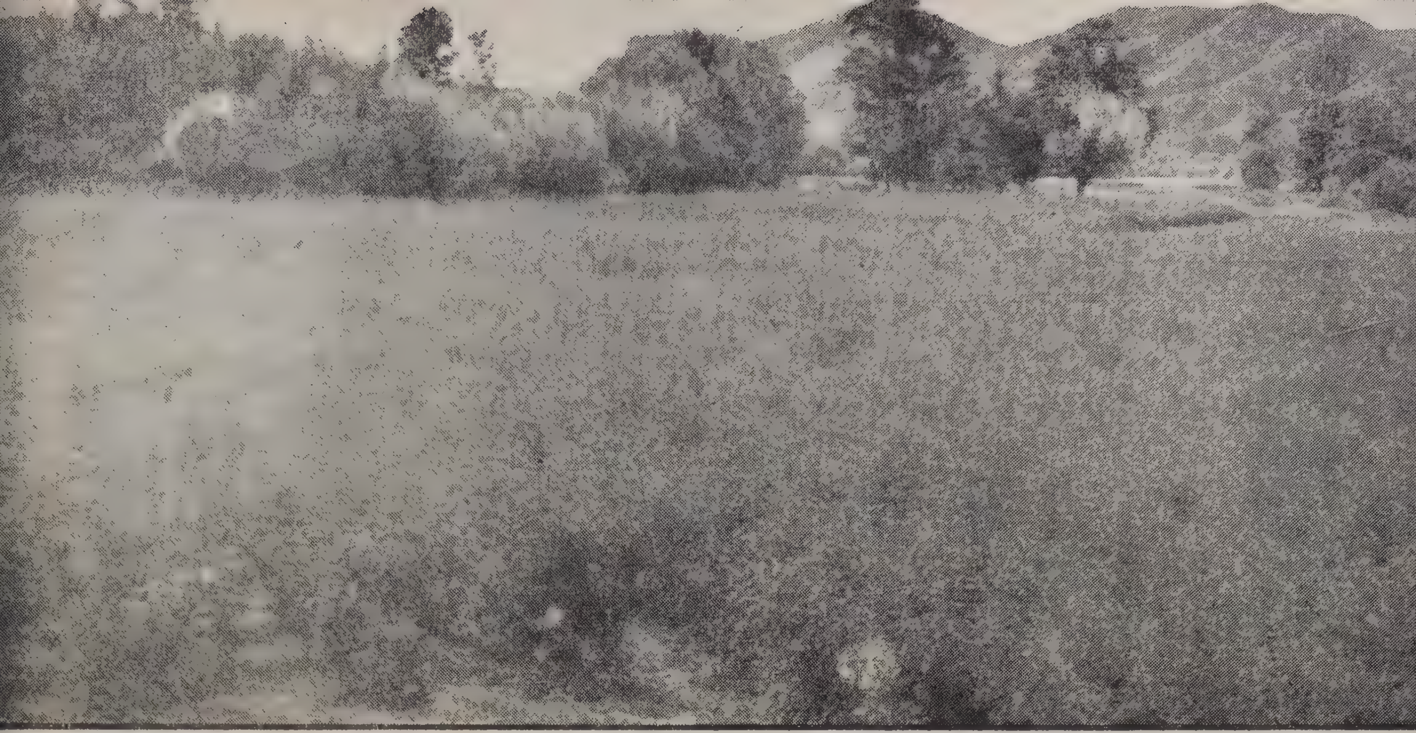
Canes and Fertiliser

In the computation of establishment costs, the charge for canes was found to be the grounds for some differences of opinion. A grower wishing to establish a new garden has three choices:—

He may take canes for planting from his garden which is already established.

He may buy canes from a neighbour, a method often adopted by growers beginning their first garden. It involves the purchaser in digging costs and a nominal sum for the canes.

He may buy canes from a nursery.



[*Kingsford and Son photo.*

A typical Nelson raspberry garden on alluvial soils adjoining a river. The soil type is also suitable for tobacco, an area of which appears in the right background.

For replacement of existing gardens in normal times the grower uses his own canes, which cost him only the labour of digging them. It is not usual to buy canes from nurseries, except for trial purposes. As many farmers allow young growers starting out to take canes free from their gardens, the second course has been allowed in the costing.

The differences in planting systems which reflect cultivation practices also cause a difference in the number of canes used. In Motueka the hill system of planting on the square is used, the rows being 6ft. apart and the stools 4ft. Growers using tractors nearly all plant 6ft. by 6ft. for ease of cultivation, and this spacing is used predominantly in Tapawera. Motueka growers favour 4 canes per stool in each of the 1800 stools per acre, using 7200 canes in all; in Tapawera 5 canes are planted per stool, of which there are only 1200 per acre.

Growers in both districts apply about 2/3 of their normal fertiliser usage during planting, and a normal year's lime allowance has been made.

COST OF MATERIALS FOR ESTABLISHING 1 ACRE OF RASPBERRIES

	MOTUEKA (s.)	TAPAWERA (s.)
Canes	475	390
Fertiliser	295	304
Lime	5	9
Fences, hedges, drains, etc.	20	20
Total	795	723

The charge against establishment for interest, depreciation, and maintenance of equipment differs from that of a normal year. There is no charge for spray equipment in either district, and the charge for discs and harrows concerns only this period, as these implements are not used during production. Similarly, whares are not included in depreciation and maintenance of buildings, as they are used only in connection with the productive garden.

Cartage of Materials

Under the heading of cartage into and on farms are such items as the carting of fertilisers and canes, and there is no marked difference between the 2 areas. The charge for transport of canes must be allowed because the digging of neighbours' canes has been included in this analysis.

COST PER ACRE FOR CARTAGE OF MATERIALS FOR ESTABLISHMENT

	MOTUEKA (s.)	TAPAWERA (s.)
Fertiliser	19	11
Lime	3	
Fertiliser to gardens ..		8
Canes	27	27
Total	49	46

Overhead Charges

Overhead items are allowed during the 2 years of establishment to the extent to which they apply. General overhead is not included, as the items which it covers are mainly concerned with harvesting a producing garden. Inspection time is calculated as a direct proportion, on an acreage basis, of a normal year's inspection time, excluding that during harvesting. A full managerial allowance is not made, as these gardens were not producing, but it was considered fair to allow a proportion of the managerial allowance on a productive garden, calculated by taking the time spent yearly on an acre of garden being established as a proportion of the time spent on a garden already producing.

Holiday pay is calculated as 1/25 of the total labour bill. Interest on overdraft or working capital has been computed for the requisite items for such periods as they are outstanding.

OVERHEAD COSTS PER ACRE FOR ESTABLISHMENT

	MOTUEKA (s.)	TAPAWERA (s.)
Inspection	104	44
Interest on working capital	75	90
Holiday pay	38	56
Managerial allowance	93	138
Total	310	328

Rent and rates were calculated on the improved value of the land without a producing garden on it, and have been charged for each of the 2 years of establishment.

ANNUAL COSTS

The annual production programme begins after harvesting time and continues until the start of the following harvest. Following is a summary of annual costs of production:—

ANNUAL PRODUCTION COSTS PER ACRE

	MOTUEKA		TAPAWERA	
	Cost (s.)	Percentage of total	Cost (s.)	Percentage of total
Productive labour	646	35.99	732	37.23
Motive power	52	2.92	73	3.74
Materials	253	14.11	272	13.83
Cartage	95	5.27	94	4.82
Interest, depreciation, and maintenance	132	7.34	219	11.15
Overhead	501	27.87	463	23.55
Rent and rates	117	6.50	112	5.68
Total	1,796	100.00	1,965	100.00

[*Kingsford and Son photo.*

Raspberry bushes planted on the 6ft. x 6ft. square system. Those in the foreground were planted 5 months previously; those behind the white pole, which is 7ft. high, were set out 12 months earlier.

Labour

The difference in labour costs may be attributed in part to the practice in Tapawera of allowing stools to grow bigger, developing into groups of 16 or more canes, compared with 12 or fewer in Motueka. An increase in the number of canes per stool brings about a more-than-proportional increase in difficulty and labour of cutting out old canes and selecting those to remain. The canes are then carted off the garden by horse and home-made sledge, after which the remaining canes in the stool are topped and tied with twine. Growers in both districts use the hill system, tying the canes near the top to consolidate the stool, or "hill."

All growers then plough on to the canes with a 1-furrow plough to protect the canes, to facilitate winter drainage where necessary, and to stifle late weed growth. The garden is left through the winter, and in spring the growers plough off the canes, cultivate, and hand grub. A difference in practice between the 2 districts occurs here, for in Tapawera many growers plough both ways when ploughing off and then cultivate to level the ground. Fertiliser is spread by hand around the canes after ploughing off and, after 1 or 2 cultivations and the hand grubbing, the soil between the rows is again ploughed on to prevent excessive weed and sucker growth. Cultivation continues through the growing period until December, and most growers must spend some time during this period hoeing out suckers which the cultivator cannot control.

Fewer than half the growers sprayed in 1947-48, but as several more had bought equipment for the following season, and as the increasing need for spraying to combat pests and diseases is being stressed by officers of the Department of Agriculture and is being realised by the growers, 2 sprays per acre over both districts have been allowed in this costing.

Despite the great value of mulching material on raspberry gardens to prevent pugging in heavier soils and to increase the water-holding capacity of light soils, it is not widely used.

Materials

Almost all growers in the Motueka area use a raspberry fertiliser mixture advocated by the Cawthron Institute, consisting of 4 parts of superphosphate, 1½ parts of dried blood, and 1 part each of sulphate of ammonia and sulphate of potash. The approved application of this mixture is 10cwt. per acre, but the average among growers in the district is 9½cwt.

[*Jack Welsh and Sons photo.*

A well-grown area of Red Antwerp raspberry canes planted on the hill system, allowing all-round mechanical cultivation to be maintained.

This mixture is also used by many growers in Tapawera, but as dried blood and superphosphate are also used to some extent, a composite fertiliser programme for the area has been costed. This consists of a total annual application of 10cwt. per acre, made up of 2cwt. of superphosphate, 4cwt. of dried blood, and 4cwt. of raspberry mixture.

Though some difference of opinion exists among growers about the use of lime, most of them use a small quantity, the average being 7cwt. every 3 years at Motueka and 11cwt. every 3 years at Tapawera.

Knapsack sprayers are used in Motueka, 200 gallons per acre being applied in each of 2 sprays. Tapawera growers use horse-drawn power sprayers, with an average of 350 gallons in each of the 2 sprays. Spray materials used are:—Motueka: 2 sprays of 200 gallons per acre (2lb. of arsenate of lead per 100 gallons of Bordeaux 5 : 4 : 50); Tapawera: 2 sprays of 350 gallons per acre (3lb. of arsenate of lead per 100 gallons of Bordeaux 4 : 4 : 50).

Picking tins can be obtained locally at a nominal price, but require paint, wire, and labour to bring them up to the required standard. They last 4 or 5 years.

MATERIALS USED PER ACRE FOR PRODUCTION

	MOTUEKA (s.)	TAPAWERA (s.)
Fertiliser	180	174
Lime	3	5
Spray materials ..	38	61
Twine	10	11
Tin allowance ..	12	11
Fences, hedges, drains, etc.	10	10
Total	253	272

Cartage

In Motueka fertiliser and lime must be carried by truck an average of 11 miles to the farm, whereas in Tapawera the average distance from the railway is only 3 miles.

In both areas journeys to collect day and resident labour are needed. Included in cartage is the charge in Tapawera for transport of fruit to the station by the owner; the charge for Motueka for this item is based on a flat rate charged by carting contractors.

CARTAGE COSTS PER ACRE FOR PRODUCTION

	MOTUEKA (s.)	TAPAWERA (s.)
Fertiliser and lime ..	13	18
Labour	15	34
Fruit	67	42
Total	95	94

Interest, depreciation, and maintenance of equipment are greatly increased in Tapawera by the inclusion of a power sprayer for raspberries. Depreciation and maintenance for buildings include those for whares, which are owned by nearly all growers in each district. As much of the harvesting is carried out by pickers from other parts of the Dominion, housing of a good standard must be supplied for them. No reduction is made in their wages for this reason. Only by such good treatment of pickers can growers get their crop harvested at all. Because of its more remote situation, Tapawera growers require twice as much worker accommodation as do the Motueka growers. Further, Tapawera gardens are larger and therefore require more pickers. This accommodation in Tapawera is used only for the raspberry pickers, whereas in Motueka half of its use is devoted to tobacco and hop workers, thus halving the charge per acre against raspberries.

Overhead Charges

Because of the nature of the farming—relatively-small areas of fertile river flats intensively cropped and hill country neglected—overhead charges per acre of the cultivated area are very high, particularly with items such as a fixed managerial allowance. This item is apportioned to each farm activity, and the charge to raspberries per acre tends to be severely weighted by the type of grower who relies for subsistence on only a few acres of this crop.

Inspection and supervision, especially at harvesting time, are almost constant over various sizes of raspberry gardens, and the owner was found to spend at least half the day weighing, laying out tins, collecting the fruit, and supervising labour. The cost per acre bears a direct relation to the number of acres which must bear the charge, and was found to be much higher in Motueka, where gardens are smaller.

Interest on overdraft or working capital is allowed for 5 months to cover all labour (except harvesting) and materials for which cash was expended during the 10 months between harvests. Holiday pay is allowed on the total labour bill.

General overhead covers such items as telephone, labour insurance, and rations. The last item is large in both areas, as milk, tea, sugar, firing, lighting, and either meat or vegetables are supplied free to resident pickers. Also included in general overhead is the ⅛d. per lb. of fruit levied by the Nelson Raspberry Marketing Committee and paid by all growers.

OVERHEAD COSTS PER ACRE FOR PRODUCTION

	MOTUEKA (s.)	TAPAWERA (s.)
General overhead ..	165	154
Inspection	153	91
Interest on working capital	18	23
Holiday pay	51	75
Managerial allowance	114	120
Total	501	463

Rent is assessed on the capitalisation of the improved value of the land used with a producing garden on it. The improved value of land suitable for raspberry growing is £55 per acre in Motueka and £40 in Tapawera, the difference being mainly the result of location and the fact that in Motueka some gardens are planted on land suitable for orchards, hop gardens, and tobacco growing.

To these values must be added an estimate of the value of an average producing garden. As a raspberry garden bears 12 harvests, the average age of all gardens at any time may be taken as 6 years, by which stage 6 annual instalments (£9 7s. 8d. in Motueka and £11 2s. 3d. in Tapawera) out of the original establishment costs will have been charged against production. This leaves a seventh-year value to each acre of garden of £56 6s. in Motueka and £66 13s. in Tapawera. When this is added to the improved value of the land, the improved value of producing gardens becomes £111 6s. per acre in Motueka and £106 13s. in Tapawera. Rent at 4½ per cent. is allowed on these amounts.

Rates levied as at 1948 in Waimea County are allowed; these amount to 17s. per acre in Motueka and 16s. in Tapawera.

[*Elmar Studios photo.*

Mechanical spray outfits are being introduced on the more efficient raspberry gardens.

[*Kingsford and Son photo.*

These girl pickers are almost hidden by the canes. Raspberry picking is responsible for a large seasonal labour demand in Nelson.

Harvesting

Picking is constant during the harvesting period of 5 to 6 weeks. The labour position has eased during the past year or two, but growers rely on seasonal workers from other districts, and so must incur considerable expenses in accommodation and rations.

These expenses are not deducted from the pickers' wage of 3d. (plus 3/25d. holiday pay allowance) per lb. of factory raspberries, and growers were careful to point out that if they did not supply good living conditions free of charge, they would not be able to obtain labour at all. Much of the picking is done by local women and children, all of whom receive the same rate of 3 3/25d. per lb.

Yields

In both areas the yield for the 1947-48 season was better than average. In many years the crop tends to be affected by dry spells during the late growing period, with the result that much of the fruit is small and of poor quality.

Information received from growers, especially in the Tapawera district, was very detailed and exact, being taken from picking tallies kept over a period of years. It was found that the overall yield tended to be higher in Tapawera than in Motueka, and fair averages would be 3584lb. and 3205lb. per acre respectively.

TOTAL COST OF PRODUCTION

The survey has established the following basic facts from which it is possible to compute the average cost of production per lb. of raspberries:—

	Tapawera	**Motueka**
Cost per acre for establishment	2,667s.	2,252s.
Cost per acre for production	1,965s.	1,796s.
Average yield per acre ..	3,584lb.	3,205lb.
Harvesting costs per lb. ..	3.12d.	3.12d.

When 1/12 of the establishment cost is added to the production costs and the total divided by the yield, the cost of actual production is 7.43d. per lb. in Motueka and 7.32d. per lb. in Tapawera. To these amounts must be added 3.12d. per lb. for harvesting, giving totals of 10.55d. and 10.44d. per lb.

Analysis of the data supplied by the growers disclosed that between 80 and 90 per cent. of the total crop was sold to the factory for jam and pulp. The remainder was disposed of to wholesale and retail merchants for sale as dessert fruit. The percentage of private sales was negligible.

FUTURE OF INDUSTRY

Growers' associations, Horticulture Division officers, and the Farm Advisory Committee of the Rehabilitation Board have stressed that it is inadvisable that raspberry growing should be undertaken as a full-time, single-crop occupation. Raspberries should be grown in conjunction with other small fruits or with orchard, market garden, or other farm enterprise to spread the risk of failure caused by weather or disease, and to provide work for casual labour at other than raspberry-harvesting time, as an extended season may help to attract and hold such workers, who are always in short supply.

Holdings of about 12 acres are of an economic size when in raspberries and other crops, and should not be loaded with too great a capital cost. Present demand is such that a considerable expansion is possible. In Nelson alone, production last year was but a third of the district's total requirements, and the same applies to a greater or less degree to all parts of the Dominion. By converting holdings, especially in Nelson, to raspberry and small fruit production, many farms at present uneconomic could be made to show a good return. The proximity of raspberry gardens to canning factories is not imperative if there is a large local market, but is nevertheless of material advantage.

The cultivation, manurial, and spraying programme allowed in this analysis is that followed by the more efficient growers. Similarly, the labour hours allowed for such work as cultivation, pruning, and tying represent the optimum required for successful operation and exceed the number performed by any but the more efficient growers. Spraying is only in its infancy and, other factors being equal, the introduction of regular sprays should increase yields considerably. Growers are becoming more aware of the effects of disease, and an increase in the use of spray plants can be expected in the future.

The costs as set out in this report accurately and fairly represent the cost of production as shown by an analysis of the data supplied by the growers and allow for a full and comprehensive programme. The over-all cost per lb. should tend to decrease if the full programme allowed is followed and the expected consequent increase in yields is obtained.

Household Poultry:

Preparing for Next Winter's Production—Popularity of Breeds—Replacement of Stock

IN all forms of livestock breeding and production planning for the future is essential. Past records in themselves count for something, but not for everything. Last year's pullets may have given highly-satisfactory results, but they may not do the same this year and next year. Further, with poultry it is not enough to think only of annual production. Account must be taken of the moult period, of the time of the year when eggs are in short supply and prices are highest, and of the obvious fact that the best returns are given by the poultry runs that produce the highest ratio of eggs in the winter. In this month's article for the household poultry keeper W. L. McIver, Poultry Instructor, Department of Agriculture, Dunedin, recommends some steps to be taken to achieve better profits.

Orpingtons are the only serious competitors to Leghorns for popularity in New Zealand.

ONE of the things to be considered in ensuring an adequate supply of winter eggs is the poultry housing. If its location and type are unsatisfactory, best results cannot be expected from the birds. Both pullets and hens must be housed in quarters which are reasonably well sheltered yet which receive enough sunshine. Provision must be made for guarding against prevailing winds and driving rains. In general, the comfort of the layers must be adequately considered and a satisfactory floor litter supplied.

Sawdust as Floor Litter

The form this litter takes is best decided by individual circumstances and the availability of supplies. The country housewife may find straw easy to obtain, but the townsman will find it scarcer and dearer. The city backyard poultry keeper usually has difficulties to surmount in lack of ground area, storage space, and spare time for attention to his poultry and garden. Where fowls are kept partly for the supply of household eggs and partly for the manure they give for the garden, while the vegetable garden is worked both to reduce domestic expenses and to supply surplus greenfeed for the hens, an excellent opportunity is given to combine two objectives cheaply. Coarse sawdust, though it absorbs moisture readily, also releases it quickly, especially when it is turned over by the scratching of poultry in their search for food or when dust bathing. It is better not to use *Pinus radiata* sawdust, but it will suffice for any but young chickens. To improve it for use both in the fowlhouse and in the garden, soil may be added to the litter. Equal parts of soil and sawdust make a good litter. They need not be mixed together first, but can be placed in the house roughly mixed; the fowls will do the rest. If preferred, 1 part by bulk of chaff can be added to 2 of soil and 2 of sawdust.

This litter should be at least 8in. deep, as it will break down considerably and will last longer than a shallower depth. Under suitable conditions it will not need total renewing for a year and by then is ideal for manuring the garden, as the sawdust is almost composted by that time. Soil and sawdust must be dry when put in the house.

White Leghorns far outnumber all other breeds in New Zealand.

A mating such as Australorp-White Leghorn usually results in "first-cross vigour."

Influences on Winter Production

Other factors which have a great influence on egg production are general management and feeding. The modern practice of using electric lighting to stimulate winter production is of more concern to the commercial and larger sideline poultry keeper, but is also of interest to some backyarders. However, in this article attention will be confined to causes of loss in winter production which arise from the laying birds themselves. The culling of poorly-producing hens was dealt with in an article in the March "Journal"; culling should have been completed by now and culls removed from the pen.

Most birds lay fewer eggs each year than they did the previous year, and at the end of their first year of laying pullets experience a major moult. Some pullets, especially early-hatched ones, moult partially (usually only around the neck) during their first winter. Though the neck moult takes about 6 weeks, the major moult and refeathering take about 12 weeks; the bird then loses its designation of "pullet" and becomes a hen. Only a few birds continue to lay eggs while moulting, and those that do usually moult very late in the season and regain feathers quickly, resuming laying in 7 or 8 weeks. The general period for birds to be off the lay through moulting is from mid-March to about the end of June.

During those months egg prices are at their highest, and as soon as birds resume laying prices decrease rapidly to their minimum. That supplies the answer to the problem of increasing profits from poultry keeping—the production of more winter eggs, even if it means a decrease in the usual percentage of spring laying. The best way to do this is to keep all pullets and use the electric lighting system; the next best method is to run all pullets without lights; and the third is to be very severe in culling so that only the best hens are retained. However, if only 1 poultry pen is available the running of hens and pullets together is inadvisable.

Now is the time to think ahead for winter egg production—not for this year because, apart from housing, management, and feeding, the supply of eggs this winter is already determined by the merits of the layers now housed. Winter of 1950 is the period to be considered, and what is decided in the next few weeks will largely determine the number of eggs produced then.

Control of Parasites

Three factors which have not been allowed for in the preceding paragraph are mortality, diseases, and parasites. The first two are too broad to be covered in this article, but some thought must be given to control of parasites. A laying house that is to be used this winter for pullets and was used last year should already have been given very important preparations for this year's inmates. If not already attended to, they should be carried out promptly.

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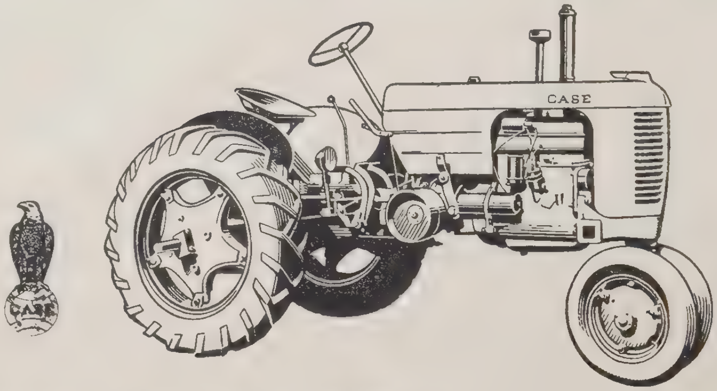

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The owner should make as sure as reasonably possible that the housing is free from parasites and diseases. The house and equipment in it should be thoroughly cleaned out and sprayed. Creosote and tar distillate are very effective, though they darken the walls and reduce the reflection of light.

It is not necessary to clean out all the floor litter provided it is really dry. That is contrary to general practice, but just as the bacterial life in a compost heap, once it is established, keeps it dry if excess moisture is prevented from penetrating the heap, so the bacteria in floor litter will keep it dry if rain does not enter the pen. Should rain dampen the litter near the open front of a house, turning it over with a fork assists the fowls to loosen it. If it cakes down too hard, the birds have difficulty in scratching it loose. Only when it is thought that the litter is too deep should some be withdrawn and new added. The bacterial life in the old litter will help to break down the new. Common sense must dictate when and how much litter should be replaced. If the old litter is damp, it is useless to add new and expect it to dry out the old. In the long run it is false economy to place too small an amount of litter at a time in a poultry house; apart from the extra labour involved in more frequent cleaning out, shallow litter becomes dirty far more quickly than when an adequate depth is used.

It is essential that the creosote or other preparation used penetrates all cracks and crevices thoroughly. If the preparation is not sufficiently thin to do this, kerosene may be added. Special attention must be paid to perches, perch fittings, droppings boards, and nests, as those are the principal places where parasites congregate.

Interior fittings and fixtures should be cleaned, hoppers, troughs, and other equipment repaired, and windows, shutters, and door catches mended.

Birds should be treated for lice and intestinal worms.

Under natural conditions the hen is required to live a vigorous life, hunting for food. She passes on to new fields before the old area becomes contaminated, or she pays Nature's penalties. The young chicks have to be strong enough to stand up to harsh conditions. The wild hen has to lay only 1 or 2 clutches of eggs in a year, and those only in spring. Modern strains are required to produce heavily, frequently are kept intensively, and the same poultry runs are used year after year. To counteract these deviations from Nature, comfortable, clean living conditions must be maintained. Fowls with high vitality and vigour, free from parasites, with proper housing and runs, correctly fed and watered, must have a better chance of escaping disease and other troubles. Poultry are naturally hardy and can withstand considerable rough treatment, but too many units are compelled to live under filthy conditions that are easily preventable.

Popularity of Breeds

Linked to some extent with egg production and annual profits is the subject of breeds or varieties. Next after the popular question asked by the beginner about how much profit can be expected from each bird is the query about the best breed to keep. Apart from the fact that this is a very difficult question to answer, there is much in favour of seeking out a good strain in a special breed rather than comparing breeds. In other words, some strains of White Leghorns will outlay the average Black Orpington, but some strains of Orpingtons will produce more eggs than the average Leghorn. If an answer must be given, it is that there is no best breed. Of course, an enthusiastic breeder of one variety will not agree with that, but it is natural to praise what is admired and to give better attention to it, thus achieving superior results.

In most circumstances a breed adapted to general requirements should be chosen. Some people dislike the bother involved in broodiness, and in that case it is useless to keep heavy-breed varieties. Others do not like the tendency for scariness and flightiness in light breeds of fowls.

Leghorns require more attention and skill in management and in really-cold climates are not able to withstand the same conditions that the larger and more efficiently-feathered heavy breeds can. On the other hand, being smaller birds and bred especially for high egg production, Leghorns will average more eggs on a smaller quantity of feed than the larger and more sluggish heavy breeds. Certainly the White Leghorn is the favourite breed in New Zealand, as elsewhere, and its only serious competitors in the Dominion are Orpingtons. Perhaps "competitors" is too strong a term, for Leghorns in New Zealand easily outnumber Orpingtons, Rhode Island Reds, first-cross strains, and all other breeds combined.

The advantages of the heavy breeds can be summarised as follows:

They are good winter layers, even when not ideally housed.

They make excellent table meat for home consumption.

They command a better price when sold as culls at markets.

They can be confined by fencing much lower than is necessary for light breeds.

They make good mother hens.

The advantages of the light breeds are:

They are high egg producers.

They rarely go broody.

They eat less food.

They can be hatched later.

They can be kept intensively better than the heavy breeds.

They do not run so much to fat.

Though as a breed Leghorns are nervous, easily frightened, and difficult to confine in fenced areas, a great deal of their temperament depends partly on their strain and largely on the owner's management. The present tendency is to breed slightly larger and heavier Leghorns, which are not nearly as flighty as the smaller strains.

Many poultry keepers know nothing about cross-bred pullets, and others confuse them with mongrels or do not like their irregularity of feather colouring. The progeny from a first cross-mating must not be confused with mongrels. Most people now understand the advantages of a first cross and know that such a mating usually results in what is called "first-cross vigour." The common cross in New Zealand is between an Orpington male and Leghorn females, but Leghorn x Orpington, Rhode Island Red x Leghorn, and Leghorn x Rhode Island Red are frequently seen. An attractive utility cross is Black Minorca x Orpington.

All these cross-breeds make excellent backyard and farmyard poultry both for laying and table purposes. They tend toward the heavy breed strain for size, good feathering, and docility. They are good winter layers, but also follow the heavy strain for broodiness. However, some strains are less broody than others, especially in their first year.

If first-cross stock is to be bought, it is even more important than with pure-bred strains to visit the breeder's farm and inspect his breeding pens. There is a tendency for breeders to pure-mate their best birds and to cross-mate their second- and third-grade birds, hoping that the male bird will make up in the mating for the deficiencies of the females. Good results cannot be expected from this class of mating, and the potential buyer is recommended to pay a higher price for better quality. This year, for the first time, first-cross breeding has been included in the conditions of the New Zealand Poultry Flock Improvement Plan, and farmers with accredited flocks can cross-mate birds only subject to stipulated requirements. These farmers are to be admired for their willingness to accept the rigid conditions laid down by the plan.

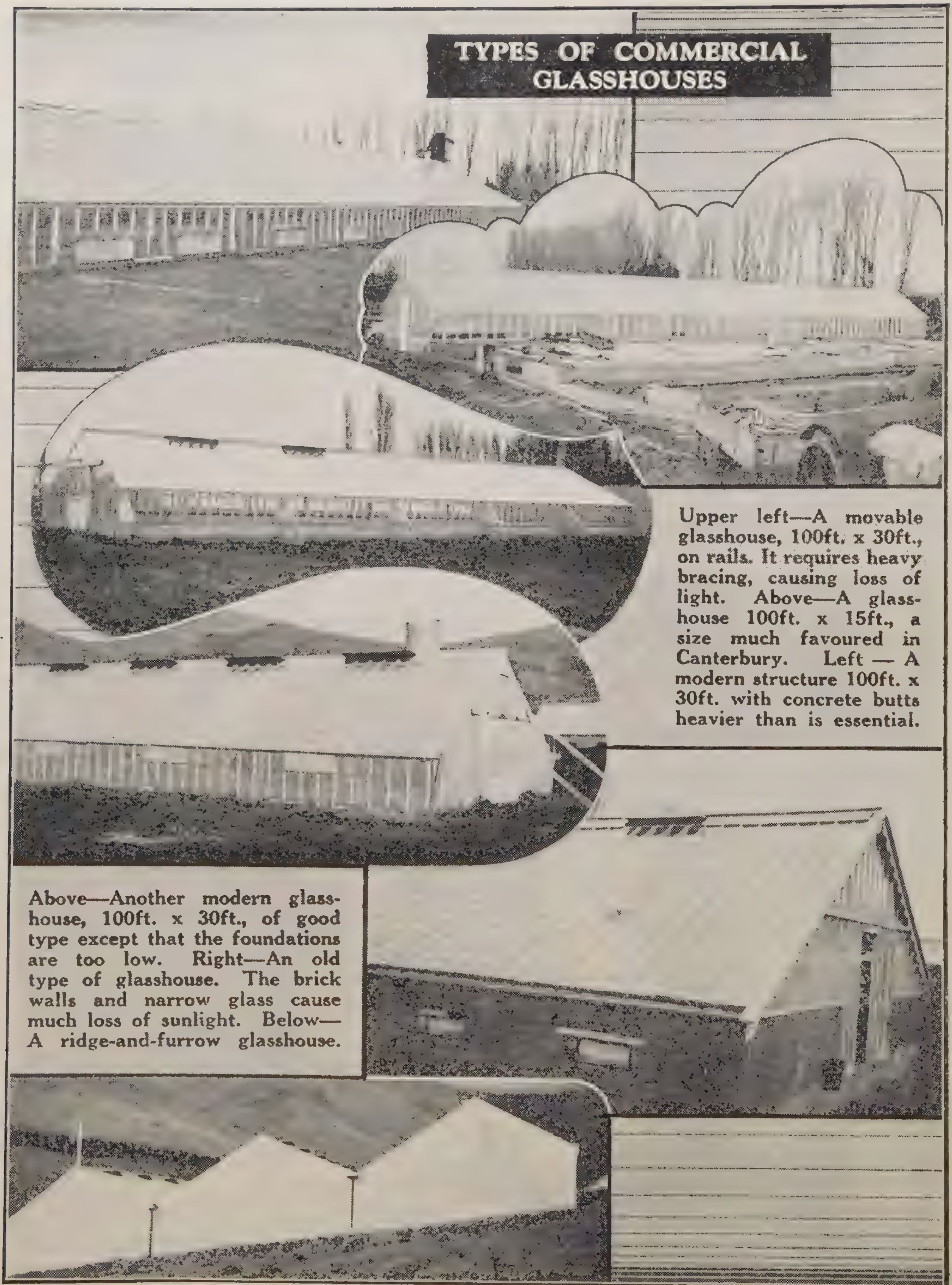
Replacement Stock

It is now too late to do anything to improve the laying ability of the hens and pullets this winter, but thought must be given to the following winter. The merits of buying chicks as opposed to breeding replacements, and the advantages of buying perching pullets and day-old chickens, will be discussed in a subsequent article. At this stage tentative plans should be made about next year's layers.

The first decision to be made is what stock is to be carried through next winter; the next is whether it is to consist of hens as well as pullets; and then the method of obtaining this stock. If it is intended to buy replacement stock, early arrangements should be made. If the order is placed late in the season, the buyer may have to take what is left over. Farms with better-class stock may even be sold out.

Quality is more important than quantity. Poor management can spoil even quality chicks, but good management cannot do much to make up for inferior chickens.

TYPES OF COMMERCIAL GLASSHOUSES



Upper left—A movable glasshouse, 100ft. x 30ft., on rails. It requires heavy bracing, causing loss of light. Above—A glasshouse 100ft. x 15ft., a size much favoured in Canterbury. Left — A modern structure 100ft. x 30ft. with concrete butts heavier than is essential.

Above—Another modern glasshouse, 100ft. x 30ft., of good type except that the foundations are too low. Right—An old type of glasshouse. The brick walls and narrow glass cause much loss of sunlight. Below—A ridge-and-furrow glasshouse.

Commercial Glasshouse Construction in Canterbury

GLASSHOUSES are erected with the view of producing crops earlier than is possible outdoors and for the growing of some crops which cannot be grown satisfactorily outdoors in the district. In this article J. Coombe, Orchard Instructor, Department of Agriculture, Christchurch, describes methods of commercial glasshouse construction used in Canterbury.

HEAT, air, moisture, and sunlight are necessary for the growth of plants. Light and heat from the sun pass readily through glass and warm the air and soil inside a glasshouse, but the heat does not pass back through the glass so readily, so the house acts as a trap and stores heat from the sun. Therefore a glasshouse helps to utilise the sun's energy to the fullest extent, so it should have the least possible amount of material to obstruct the sunlight, consistent with the required stability and strength of the structure.

In the past some glasshouses have been built without enough consideration of such factors as soil type, drainage, sunlight, shelter, and water supply, with the result that crops have been restricted in quantity and quality. Sometimes these disadvantages can be overcome, but usually it is costly, and often other disadvantages result. For example, if a glasshouse has been built on a low, poorly-drained area, the soil level may have to be built up inside the house to give better drainage, which results in height in the house being lost, especially along the walls.

Soil and Drainage

More attention should be given to a thorough inspection of the subsoil than to the topsoil before a glasshouse is built for tomato culture. The subsoil should be well drained and porous, and there should be at least 2ft. of soil above the highest level to which water ever rises. Many crops are lost or badly checked through waterlogging of the soil, which may kill the roots or leave them susceptible to attack by diseases.

The fertility of the topsoil can be built up by growing green crops, digging in straw, or changing the soil, so the topsoil should be regarded as of secondary importance to the subsoil when a site on which to erect glasshouses is being selected.

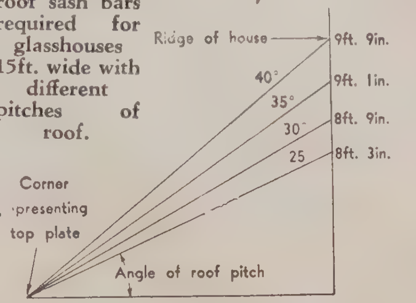
If drainage work is necessary, it should be done before building is begun. Provision should also be made for carrying away water running off the roof.

Sunlight and Shelter

Glasshouses are built to catch the maximum of sunlight, so every precaution should be taken to ensure that they are sited so that other buildings or tall-growing trees will not cut off the sunlight either then or in the future.

Adequate shelter from cold winds should be provided as soon as possible. Crops in unheated glasshouses in cool positions are considerably later than in those that are well sheltered and the fuel account is increased considerably in heated houses unless shelter is provided.

Lengths of roof sash bars required for glasshouses 15ft. wide with different pitches of roof.



Water Supply

A plentiful supply of good water is essential, and at no period should there be a shortage. A glasshouse 100ft. x 30ft. requires 50,000 gallons to equal an annual rainfall of 32in. and on the average soil that would be the minimum for tomato culture.

Orientation of House

When he is satisfied that the considerations mentioned can be fulfilled, the intending grower should decide at what time of the year his crop is to be planted, which will be affected by the location and whether the house is to be heated.

If crops are to be planted in June or July, there may be advantages in a house running east and west, but if planting is not to be started until August, the house should have the ridge running north and south. The more directly the sun's rays strike the glass, the greater the benefit the plants will receive from them, and a house with one side facing north offers no obstruction to sunshine at midday. If the house runs north and south, however, the sun's rays are greatly obstructed by the sash bars during the middle of each day throughout the winter, when the sun is relatively low in the sky.

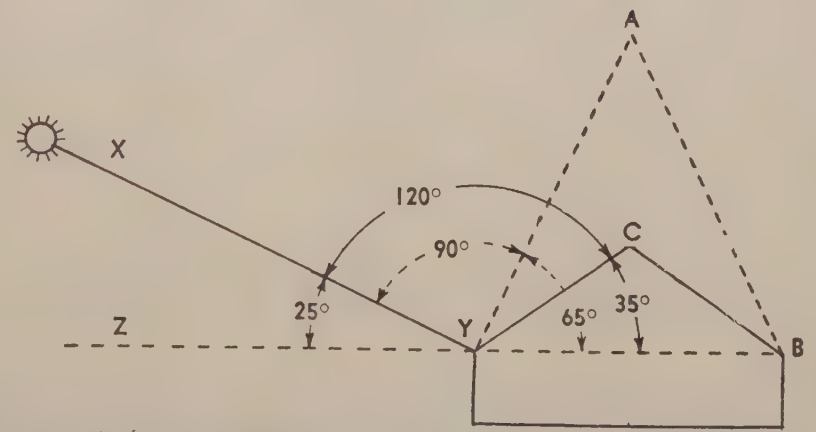
Pitch of Roof

The pitch of the roof should never be less than 26 degrees. Roofs of less pitch are usually hard to prevent from leaking, are more subject to damage by hail, and are more inclined to drip when condensation takes place. For the greatest benefit from the sun in winter, the roof should have a 65-degree pitch, but that would be far too costly to build. A pitch of 35 degrees appears to be the most economical compromise for houses to be used for winter cropping, and 30 degrees is more suitable for unheated houses being used for producing crops a few weeks earlier than is possible outdoors.

The following table gives the loss of the sun's energy at different angles:—

Angle of incidence of sun's rays as they strike the glass (degrees)	Loss of light and heat by reflection (per cent.)
90	Nil
60	2.7
40	5.7
30	11.2
20	22.2

EFFICIENCY OF GLASSHOUSE ROOF



XYZ—The greatest height the sun reaches in Christchurch in July. YCB—A glasshouse roof with a pitch of 35 degrees, which loses 2.7 per cent. of the sun's energy. XYC—The angle of incidence of the sun's rays on the roof. YAB—A roof with a pitch of 65 degrees, which would be required to absorb all the sun's energy.

COMMERCIAL GLASSHOUSE CONSTRUCTION . . .

The highest the sun reaches at Christchurch in May is 28 degrees, in June 23 degrees, in July 25 degrees, in August 32 degrees, and in September 43 degrees. A glasshouse sited east and west and having a roof pitch of 35 degrees in Canterbury would lose only 2 to 3 per cent. of the sun's energy at noon in July.

The reason for building houses north and south where it is not intended to plant them until August is that the sun is then gaining strength and rising higher in the sky each day, and its full energy is not required, especially in well-sheltered locations. In a house built in this direction the sash bars give more shade and protection to the plants from the strongest rays of the sun, which is an advantage during summer.

Size and Type of House

In the past, houses have been built in a great variety of sizes and styles, sometimes with walls of brick and glass panes in the roof only 10 to 14in. wide. Because of the large amount of timber in the roof, as well as the use of brick walls, up to half the sun's energy has been lost in this type of structure, and the smaller sheets of glass usually are more damaged by hailstorms. The walls were usually built only 2 to 4ft. high, which made working conditions difficult as well as losing the grower revenue because of the restricted height to which tomato plants could be grown near the walls.

The trend now is to build walls to a height of about 6ft. most of which is glass, and nearly all houses now being erected conform to the standard sizes described, which have come to be regarded as the most efficient.

Single-span House

Single-span houses measuring 100ft. x 30ft. are now generally favoured by growers in Canterbury for tomato production. Such a width does not call for excessive bracing, and the roof can be reasonably-steep without making the cost prohibitive. Unduly-long houses increase the cost of carrying the produce out. A house 100ft. x 30ft. costs less per sq. ft. to erect than a smaller one, timber can be used that does not restrict light unduly, fluctuations in temperature are not as great and the cost of heating is less because of the larger volume of air contained in relation to the outside surface of glass.

On the other hand, a grower can spread his crop over a longer period if he has several smaller houses. They can be used more easily for the growing of cucumbers and the propagation of plants, and should disease occur, it can be isolated more easily in several smaller ones than when the whole crop is in one large house. However, undue weight should not be given to the last point, as tomato diseases can be controlled by modern methods.

The 100ft. x 15ft. house is becoming more popular in Canterbury. Almost every grower who has built this size of house is growing tomatoes in troughs running the full length of the house, and it is claimed that working conditions are better and that the plants get more sunlight and better air circulation than in the 100ft. x 30ft. house. The house also appears to be of an ideal size for the growing of cucumbers and the propagation of plants.

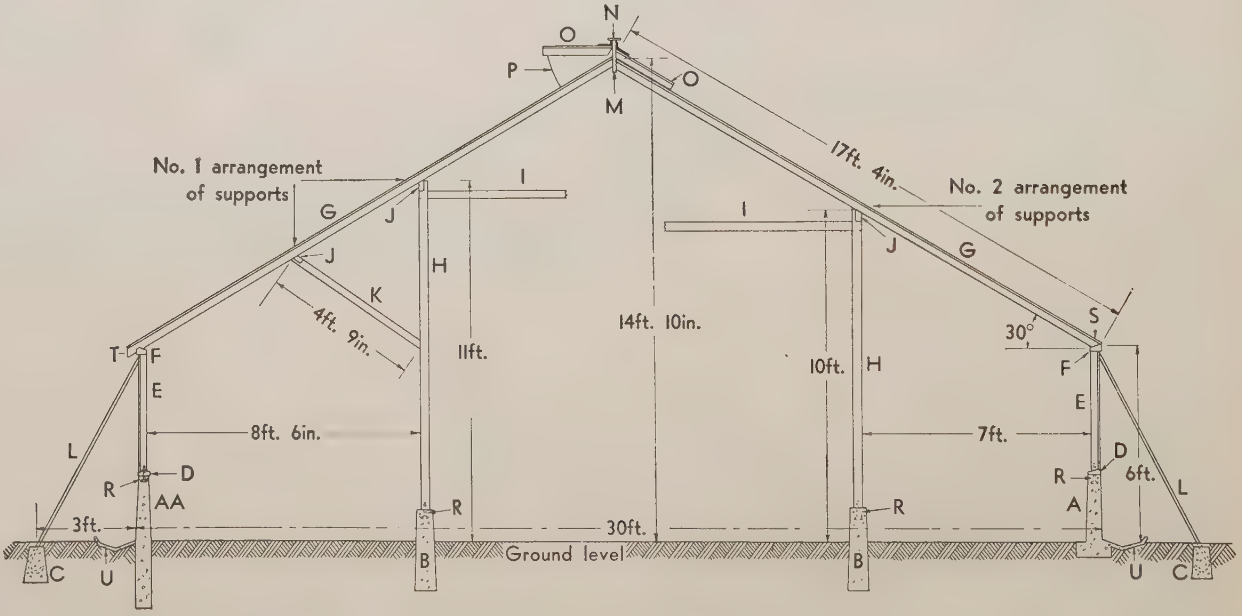
Though not large enough for the commercial production of tomatoes, a glasshouse 50ft. x 15ft. is very useful for the propagating of plants and the growing of cucumbers, and, if desired, it could be easily increased to 100ft. long. Temperatures fluctuate more rapidly in the smaller houses, and the cost of heating is greater per cub. ft. of air.

An intending grower should build his houses to a standard size with a view to making extensions later, selecting one of the sizes quoted. Measurements and sizes of timber given in this article are for the glasshouses which have been mentioned.

Ridge-and-furrow House

Though ridge-and-furrow houses are common overseas, they are not favoured in Canterbury. Some have been erected there, but many growers throughout New Zealand say they would not erect this type again. They are cheaper to build because of the

Cross-section of a Glasshouse 100ft. x 30ft., showing alternative methods of construction



A—Shallow concrete foundation. AA—Alternative deep concrete foundation. B—Concrete butts for purlin posts. C—Concrete blocks for outside anchors. D—Bottom plates. E—Side wall sash bars. F—Top plates. G—Roof sash bars. H—Purlin posts. I—Cross-ties. J—Purlins. K—Brace from purlin post to roof. L—Outside pipe braces. M—Ridge board. N—Ridge cap. O—Top ventilators. P—Ventilator opening arm. R—Bolts set in concrete foundations and purlin butts. S—Roof sash bar fitted to finish flush with the outside wall; no weather strips are required. T—Alternative roof sash bar fitted to overhang the wall; weather strips are required between glass and top plate. U—Concrete gutters at ground level.

saving of materials in the common side walls, the centre houses are sheltered by those on either side, they conserve space, and they require less fuel to heat than do single units.

The disadvantages of this type of construction are that the centre houses are more shaded, side light and side ventilation are obstructed in the centre houses, the whole area has to be planted at the same time because of the heating, snow or hail banks up in the gutters, the gutters are difficult to keep in good repair, and disease can travel through the whole area more readily than would be possible in a number of single units.

Cantilever House

The cantilever glasshouse is usually recommended because of the greater ease of cultivation given by a floor free of obstructions, but nothing is gained with mechanical cultivation in this type as compared with those having purlin posts. Because of the angle of the braces running from roof to ground level, mechanical equipment cannot be used close to the walls. The braces must also be closer together or the timber heavier than when purlin posts are used, thereby reducing the light.

Lean-to House

No lean-to glasshouses are in use in Canterbury for growing tomatoes on a commercial scale, though a number are being used for the propagation of plants and a few small ones for grape culture. As this type of house is not likely to be built for the growing of crops on a large scale, no details of its construction are given.

Materials and Sizes

Before the concrete foundations are laid, the exact size of the intended building should be worked out carefully. For instance, it is better to make the house to fit the glass than to have to cut down one run of glass.

The following tables give the overall measurements of houses and the numbers of sash bars when glass 16, 18, or 20in. wide is used, but they apply only if the timber has been cut strictly to specifications:—

100ft. x 30ft. Glasshouse

16in. glass: 67 sash bars + 2 end bars = 99ft. 6¼in. long, or 68 sash bars + 2 end bars = 100ft. 11½in. long. 19 sash bars + 2 corner posts = 30ft. 6¼in. wide.

18in. glass: 60 sash bars + 2 end bars = 99ft. 9½in. long, or 61 sash bars + 2 end bars = 101ft. 4¾in. long. 17 sash bars + 2 corner posts = 30ft. 9¾in. wide.

20in. glass: 54 sash bars + 2 end bars = 99ft. 6in. long, or 55 sash bars + 2 end bars = 101ft. 3½in. long. 15 sash bars + 2 corner posts = 30ft. 5¼in. wide.

100ft. x 15ft. Glasshouse

The numbers of sash bars and the lengths of the houses are the same as for 100ft. x 30ft. houses, but the exact widths are:—

16in. glass: 9 sash bars + 2 corner posts = 16ft. 1¼in., or 8 sash bars + 2 corner posts = 14ft. 8½in.

18in. glass: 8 sash bars + 2 corner posts = 16ft. 4½in., or 7 sash bars + 2 corner posts = 14ft. 9¼in.

20in. glass: 7 sash bars + 2 corner posts = 16ft. 3¼in., or 6 sash bars + 2 corner posts = 14ft. 6in.

50ft. x 15ft. Glasshouse

Widths are the same as for 100ft. x 15ft. houses, and the exact lengths and numbers of sash bars required are:—

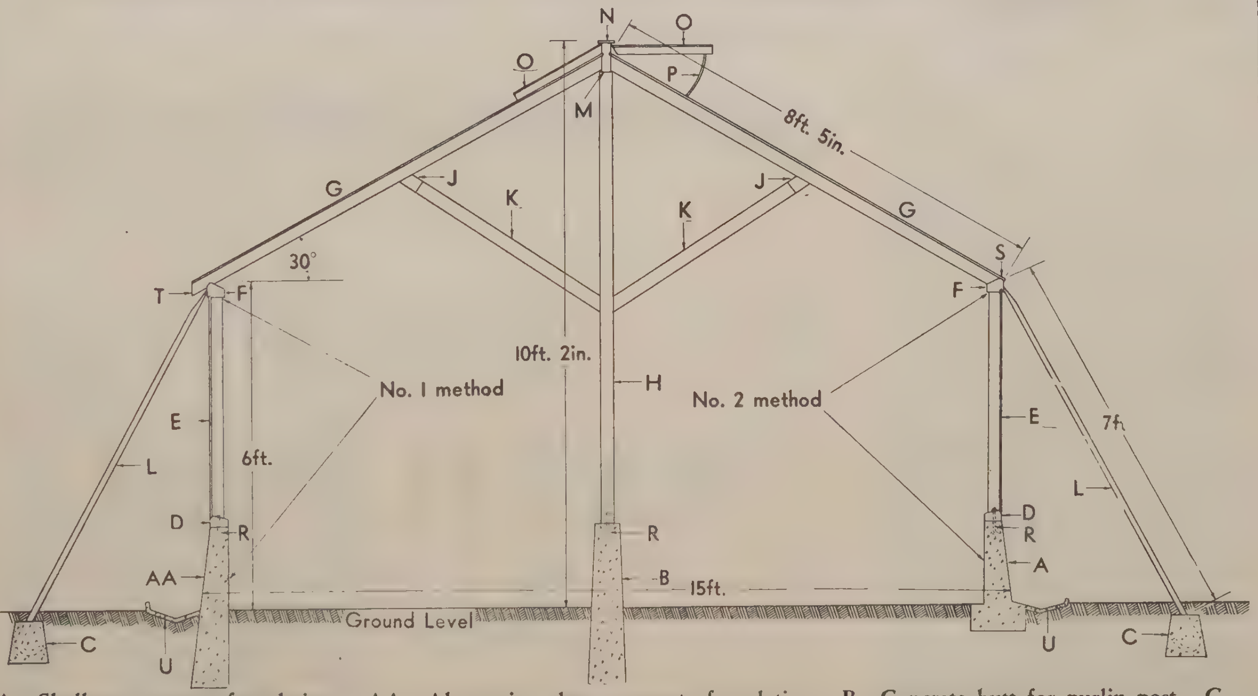
16in. glass: 33 sash bars + 2 end bars = 50ft. 7¼in.

18in. glass: 29 sash bars + 2 end bars = 50ft. 0¾in.

20in. glass: 26 sash bars + 2 end bars = 49ft. 11in.

Concrete foundation: The strength of the concrete should be at least 1 to 7. The foundation should be 12in. wide and 6in. deep on average soil, built so that the top of the foundation is level with the ground surface. On some soils, especially on sloping land, the foundation should be deeper to give greater stability. It is an advantage

Cross-section of a Glasshouse 100ft. x 15ft., showing alternative methods of construction



A—Shallow concrete foundation. AA—Alternative deep concrete foundation. B—Concrete butt for purlin post. C—Concrete blocks for outside anchors. D—Bottom plates. E—Side wall sash bars. F—Top plates. G—Roof sash bars. H—Purlin post. J—Purlins. K—Braces from purlin post to purlins. L—Outside pipe braces. M—Ridge board. N—Ridge cap. O—Top ventilators. P—Ventilator opening arm. R—Bolts set in concrete foundations and purlin butt. S—Roof sash bar fitted to finish flush with the outside wall; no weather strips are required. T—Alternative roof sash bar fitted to overhang the wall; weather strips are required between glass and top plate. U—Concrete gutters at ground level.

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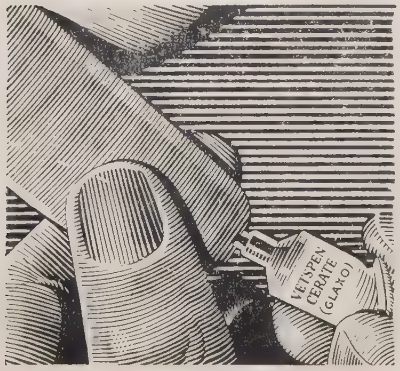

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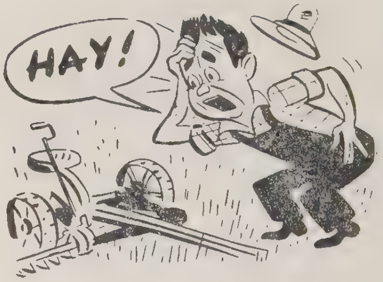

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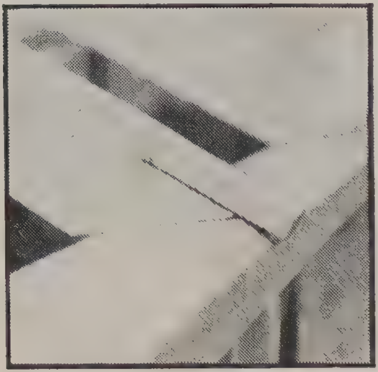
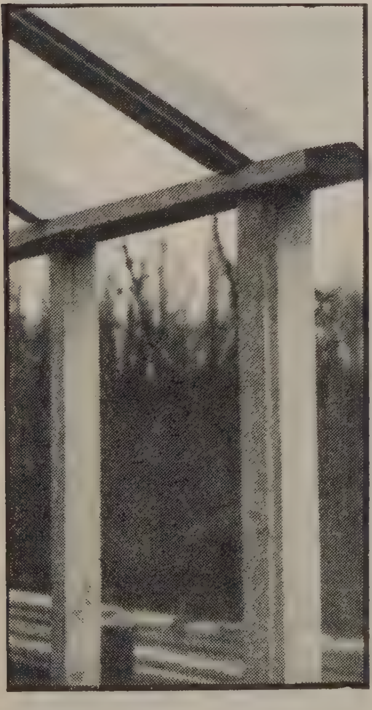


A sash bar, with slot for sliding a metal strip under the glass, fitted to a top plate. No weather strip is required.

to extend the concrete foundation on the outside of the house a further 12 to 15in. and curve the outside of it upward to form a gutter to carry away rain water falling from the roof. This gutter also prevents weeds and grass from growing close to the house and encouraging dampness near the walls, and obviates the use of the usual guttering along the eaves, which is easily torn off by snow or hailstorms. The concrete wall should project 14in. above the ground if 18in. glass is being used and 20in. for 16in. glass to give a finished wall 6ft. high. The wall should be built high enough to give the necessary height to the eaves without the glass having to be cut. The bottom of the wall should be 7in. wide, tapering to 5in. at the top. Half-inch bolts, embedded threaded end up at intervals in the concrete before it has begun to set, are required for bolting down the bottom plate.



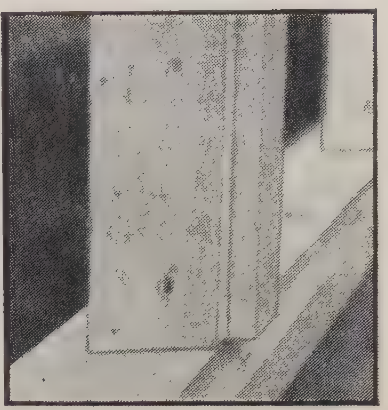
A corner assembly, showing the rebates on the corner post and end sash bar.

Damp course: Before the bottom plate is placed in position a mixture of damp course should be applied to the top of the concrete wall. To make this, spread out a bag of sand, make a saucer-shaped hollow in the middle, and into this pour some water and muddy it up slightly with the sand; pour in some thin tar and gradually work the whole into a mixture of about the consistency of thick cream. Use about 1 gallon of tar to each bag of sand. This mixture will set as hard as concrete, and woodlice and other insects will keep away from it, but the main purpose of the damp course is to prevent dampness from rotting the timber.

Top and bottom plates: Many shapes and sizes of plates have been used in the past. The most important points are that they be cut on an angle and that the upper surfaces slope inward from the point where the glass meets the plates so that water cannot lie. The bottom plate is best cut from 5in. x 4in. jarrah timber. By cutting this on an angle, two pieces 4in. x 3in. x 2in. can be secured from each length. Oregon is more suitable for the top plate, as it is less likely to warp. The top plate can be so constructed that weather strips are not necessary and only a small area of glass surface rests on the wood, but the roof does not overhang the walls in this type of construction. If a large area of glass is lying flat on the top plate, breakages will probably occur during frosty periods because of the freezing of water beneath the glass. A strip of galvanised iron slid up under the glass is an advantage at this point.

Roof and sash bars are cut from 3in. x 2in. or 2in. x 2in. Oregon, according to the size of the house. The 2in. x 2in. timber is suitable for houses 15ft. wide; 3in. x 2in. material is required for houses 30ft. wide. This timber must be rebated both sides ⅝in. deep and 5/16in. on. The diagram on page 597 shows a method of working out the length of roof sash bars required for a house of any width and roof pitch. If the house is to be 30ft. wide, draw a line 15in. long (representing half the width of the house on a scale of 1in. to 1ft.), and run a line at right angles from one end of this; with a protractor measure the desired degree of roof pitch, and run a line from the corner representing the top plate to the ridge in the centre of the house. The length of this line then represents the length of sash bar required. The drawing must be done to exact scale or measurements will not be correct.

Sash bars for the ends of the house are cut long enough to be fitted tightly between the bottom plate and the end bar. They are cut from 4in x 2in. Oregon for houses 30ft. wide and from 3in x 2in. for houses 15ft. wide, and they are rebated to the same measurements as the roof and sash bars.

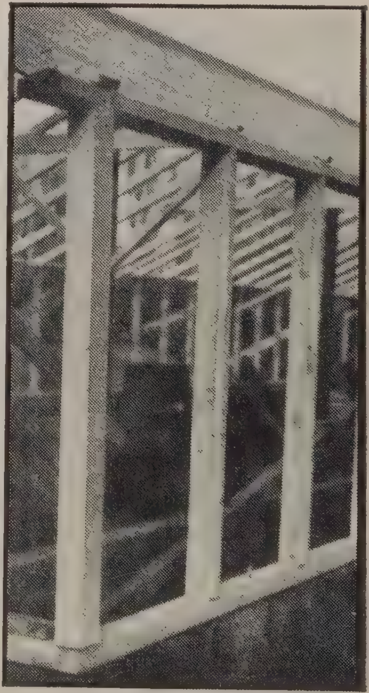


A side wall sash bar and bottom plate assembled, showing the rebates for the glass.

The ridge is cut from a piece of Oregon measuring 6in. x 1½in. for a 30ft. house and 5in. x 1½in. for a 15ft. house. This must be rebated to ¼in. deep on both sides to allow the glass to be fitted in.

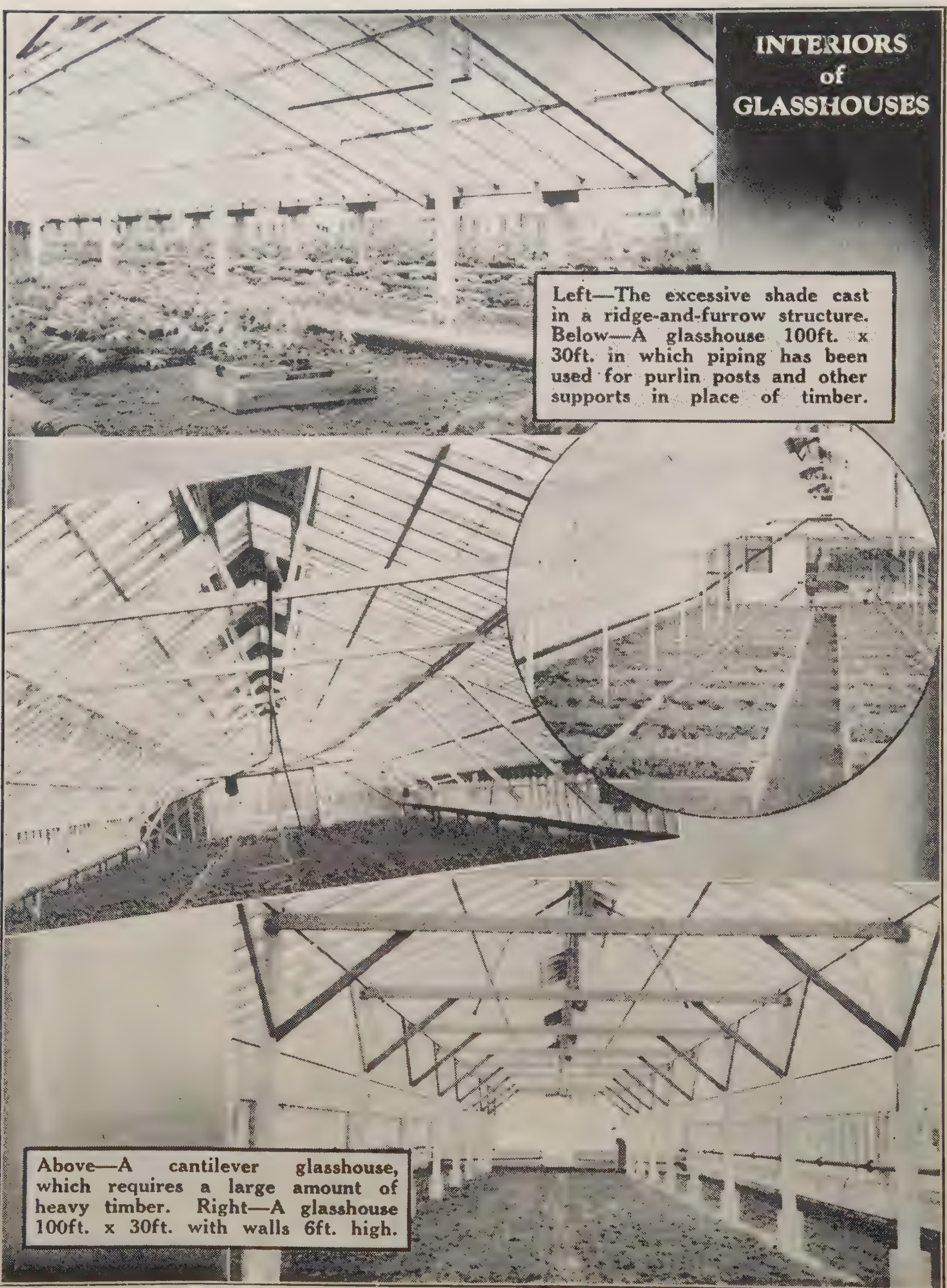
The ridge cap is cut from 4in. x 1in. Oregon and is fitted directly on top of the ridge. The underside of each side of the cap should be rebated or channelled to stop water from running down the ridge board.

End bars are cut from 3in. x 3in. or 3in. x 2in. Oregon for a wide or narrow house. They are rebated on opposite sides ⅝in. deep and 5/16in. on to take the roof and end wall glass.



A side assembly, showing the inward slope of the top and bottom plates.

INTERIORS of GLASSHOUSES



Left—The excessive shade cast in a ridge-and-furrow structure. Below—A glasshouse 100ft. x 30ft. in which piping has been used for purlin posts and other supports in place of timber.

Above—A cantilever glasshouse, which requires a large amount of heavy timber. Right—A glasshouse 100ft. x 30ft. with walls 6ft. high.

Corner uprights are cut from 3in. x 3in. or 3in. x 2in. Oregon for a large or small house and they are rebated on opposite corners to take the glass along both the end and the side of the house. The rebates are cut ⅜in. deep and 5/16in. on.

Door posts are cut from 3in. x 3in. Oregon if sliding doors are to be used, but if hinged doors are to be fitted, 4in. x 3in. timber is better. The door posts should reach from the bottom plate to the end bars.

Erecting the House

The side walls are first built into position and braced. The ridge board is next placed in position by temporarily fixing roof bars directly opposite each other. In fixing the roof sash bars into their permanent positions, great care must be taken that the spacing is exact, or trouble will be experienced when glazing the house. The easiest way to do this is to use as a gauge a board ¼in. wider than the glass to be used. Temporary bracing must be used as the work progresses to make sure that the structure is not getting out of alignment.

The end bars are then fixed, taking the same precautions to have the measurements exact.

Purlins and purlin posts are next placed in position and made secure. Purlins are cut from 5in. x 2in. timber, the top edge being the same pitch as the roof, and a cross-tie of the same size timber should be used.

In a 100ft. x 30ft. house, 2 rows of posts, 1 on each side of the house, are necessary to support the roof, and these should be 3in. square. The concrete piers project at least 1ft. above the ground and the base reaches down at least as deep as the soil is to be trenched. A pier 2ft. 6in. long and 8in. square at the base, tapering to 6in. at the top, would meet the average conditions. A ½in. bolt, head down with 3in. projecting, is placed in the top of the concrete pier before the concrete sets.

A hole is bored in the centre of the purlin post to fit the bolt, a piece of tarred roofing material is fitted over the top of the concrete butt, and the post is dropped down on to the pier over the bolt. The purlin is secured into position and the cross-brace bolted to the posts directly beneath the purlin.

Approximate Cost of Glasshouse Materials (excluding heating equipment) at Present Prices

SIZE OF HOUSE

	100ft. x 30ft.			100ft. x 15ft.			50ft. x 15ft.		
	£	s.	d.	£	s.	d.	£	s.	d.
Timber	229	0	0	135	12	0	73	10	0
Glass, 24oz.	264	16	0	145	0	0	78	0	0
Concrete	22	4	6	15	17	6	12	14	0
Joinery	67	0	0	42	0	0	27	0	0
Ironmongery	55	1	6	36	16	9	22	1	0
Paint and putty	18	12	0	12	13	9	8	0	0
Incidentals and cartage	25	0	0	18	0	0	12	15	0
Total cost of materials	681	14	0	406	0	0	234	0	0
Labour	270	0	0	200	0	0	125	0	0
Total cost per house	951	14	0	606	0	0	359	0	0
Total cost per sq. ft.		6	4		8	1		9	7

A house 15ft. wide needs only 1 row of purlin posts, placed along the centre of the house directly beneath the ridge. Braces are fastened from the posts to the purlins on each side in the form of a V.

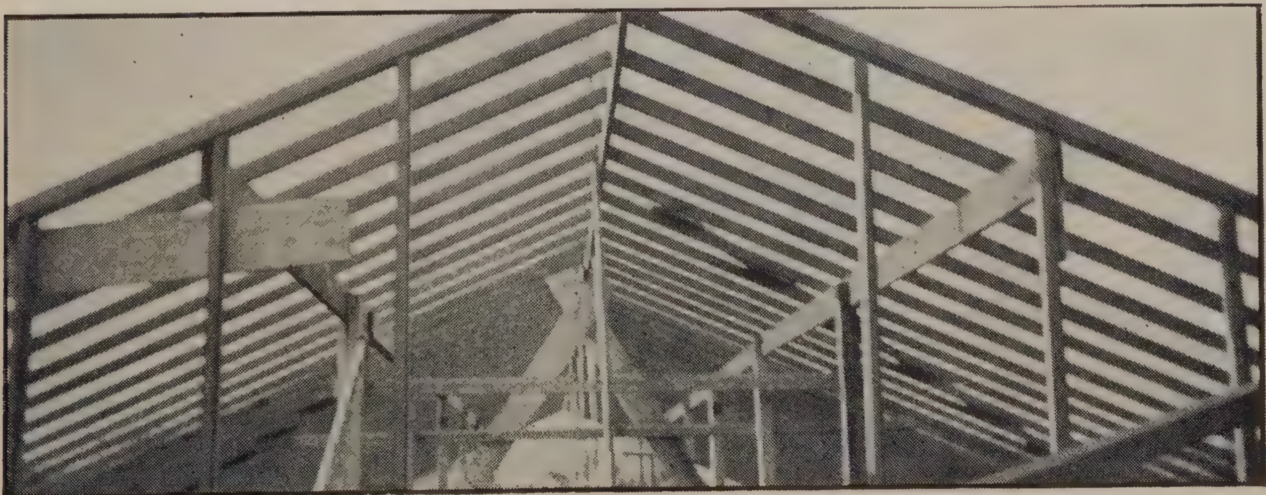
Piping can be used for purlins, purlin posts, and bracing. It makes an excellent job and casts less shade than timber because it is smaller. Second-hand boiler tubing or 1½in. galvanised pipe is quite suitable. A length of pipe is fastened to the sash bars by means of U straps and the uprights are placed directly beneath the purlin and secured in position with a block of wood. Piping is cheaper than wood, equally strong, and will last a lifetime.

When sash bars of 3in. x 2in. timber are used with glass 16in. wide, the purlins should be not more than 8ft. apart. That distance should be decreased as the width of the glass is increased, because there are fewer bars to carry the weight. That does not mean that extra rows of posts are required, as a brace from the cross-tie to the extra purlin could be used. With 1 row of posts on either side of a 30ft. house, they should not be more than 8ft. apart when the purlins are of 5in. x 2in. timber or 1½in. piping.

Bracing

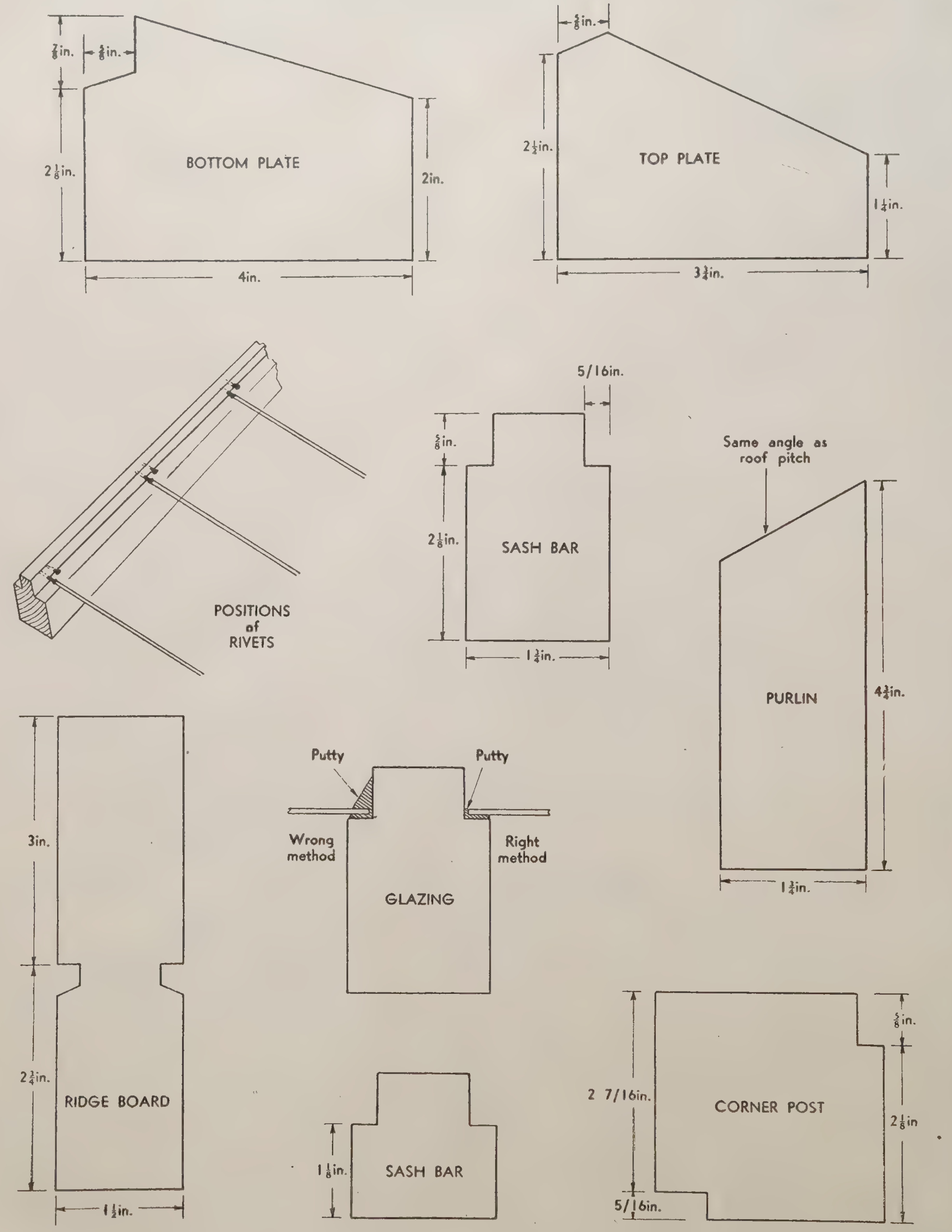
The only braces necessary in the types of houses built to the recommended specifications are made by sinking pieces of 1in. or 1¼in. pipe into concrete blocks 3 or 4ft. from the wall along both sides of the house and bolting them to the top plate. They should be opposite each third purlin post. Houses of this type have been up for 18 years and are still in perfect alignment.

Some growers use a number of V braces from the purlin posts to the roof, but they should not be necessary. Working conditions are hampered and sunlight restricted by increasing the number of posts and braces, so a house should have as little timber in it as is consistent with the required strength and stability.



Adequate bracing is required during the construction of the framework.

CROSS-SECTIONS OF GLASSHOUSE TIMBERS AFTER BEING DRESSED


7/8in.
5/8in.
2 1/8in.
BOTTOM PLATE
2in.
4in.
5/8in.
2 1/2in.
TOP PLATE
1 1/4in.
3 3/4in.
5/16in.
5/8in.
2 1/8in.
SASH BAR
1 3/4in.
Same angle as roof pitch
PURLIN
4 3/8in.
1 3/4in.
POSITIONS of RIVETS
3in.
2 3/4in.
RIDGE BOARD
1 1/2in.
Putty
Putty
Wrong method
Right method
GLAZING
1 1/8in.
SASH BAR
5/8in.
2 7/16in.
CORNER POST
2 1/8in
5/16in.

Double hanging doors allow entry of a small truck or tractor and trolley.

Ventilators

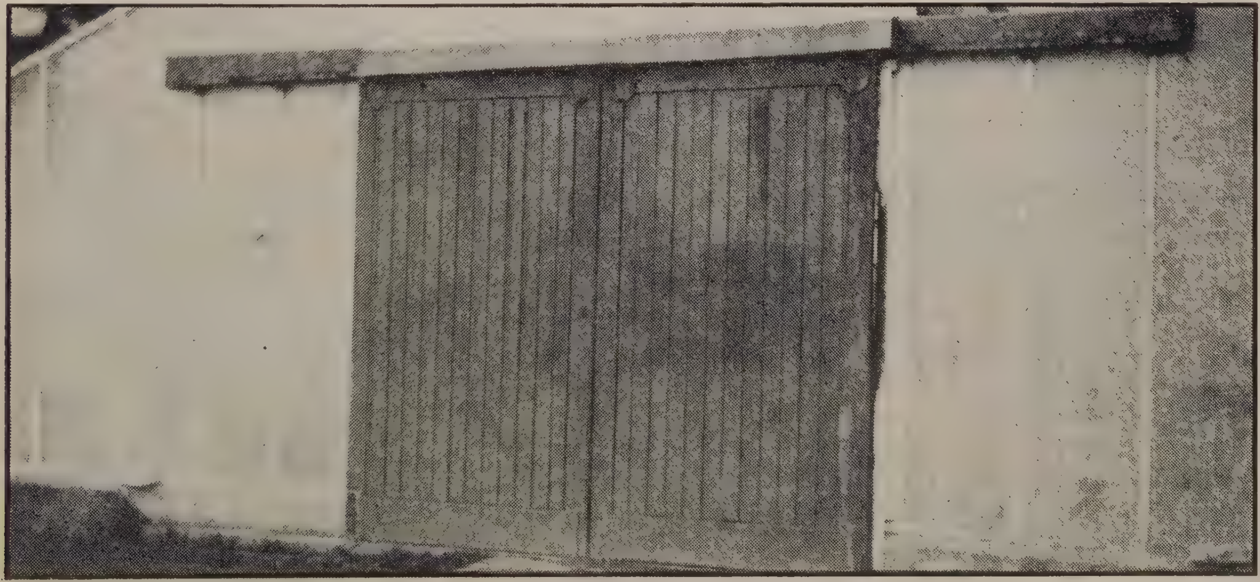
The ventilators are used not only to change the air to keep it fresh but also to control the temperature and humidity of the house. As glasshouses are subject to quick changes in temperature, adequate ventilation is essential, and doors frequently cannot be used for ventilating because of draughts affecting the plants.

The air in a glasshouse is warmer than that outside, and as warm air rises the main ventilators are placed along both sides of the ridge, allowing this air to escape if necessary to keep the temperature of the house correct. Usually enough cool air enters the house between the joins of glass to make side ventilation unnecessary except under certain conditions in some localities, such as in very sheltered areas like warm valleys.

Ventilators are best made of glass, as flat iron cuts off some sunlight from the plants. The total length of ventilators required in the roof is equal to the length of the house, and they are usually one pane of glass deep if 16in. or larger glass is used in a 30ft. house. The ventilators could be reduced to one pane of glass 12in. deep in a 15ft. house. In very warm localities more ventilators help to keep the temperature from rising excessively during hot weather. An equal number of ventilators is placed on either side of the ridge, usually staggered so that one is not directly opposite another. Ventilators up to 4ft. long require only 1 opening arm, those from 4 to 7ft. require 2, and those longer than 7ft. 3 to hold them securely.

A ventilator fitted in the gable at each end of the house directly above the doors assists greatly in keeping the air circulating when the top ventilators can be opened only a very little. They can be opened fully during hot weather to allow a current of air to pass directly along the house well above the plants. These end ventilators should be built to fit between either 2 to 3 sash bars and should be at least 18in. deep. Two hinges are fitted to the top so that they open outward.

Most glasshouses being erected on the flat in Canterbury are not being fitted with side ventilators. Practically all the older houses have these ventilators, but very few growers



Wooden double doors shut out too much sunlight.

Approximate Quantities of Materials for Single-span Glasshouses

100ft. x 30ft. House

Bottom plate	130 running ft. of 5in. x 4in. jarrah
Top plate	100 running ft. of 5in. x 4in. Oregon
Ridge	100 running ft. of 6in. x 1½in. Oregon
Ridge cap	100 running ft. of 4in. x 1in. Oregon
Purlins	200 running ft. of 5in. x 2in. Oregon
Purlin posts	22 pieces of 3in. x 3in. jarrah (length determined by roof pitch)
Cross-ties	22 pieces of 5in. x 2in. Oregon 15ft. 6in. long
Glass	48 cases (for house with roof pitch of 30 degrees)
Top ventilators	18 to 22, each 3 panes wide *
Side ventilators	12 to 16, each 3 panes wide
End ventilators	2, each 2 or 3 panes wide
Doors	2 hanging doors each end, 3ft. 6in. x 6ft. 6in. high
Shingle and sand	14yds.
Cement	35 bags
Paint	6 gallons
Putty	2cwt.
Nails	34lb. of 3in., 6lb. of 4in.
Brass boot rivets for glazing	7lb. of ¾in. flat heads
Bolts	7 dozen 6in. x ½in.
Hanging door equipment and locks	2 sets
Ventilator hinges	2 9in. T hinges for each vent
Damp course	3 gallons of tar, 3 bags of sand
Piping for operating top vents	200ft. of 1in.
Piping for operating side vents	200ft. of 1in.
Vent-operating gear	1 set for each vent up to 4ft. long, 2 sets for each larger vent

* For average climatic conditions in Canterbury.

100ft. x 15ft. House

Bottom plate	115 running ft. of 5in. x 4in. jarrah
Top plate	100 running ft. of 5in. x 4in. Oregon
Ridge	100 running ft. of 5in. x 1½in. Oregon
Ridge cap	100 running ft. of 4in. x 1in. Oregon
Purlins	200 running ft. of 4in. x 2in. Oregon
Purlin posts	11 pieces of 3in. x 3in. jarrah (length determined by roof pitch)
Purlin braces	22 pieces of 4in. x 2in. Oregon, about 5ft. long, according to roof pitch
Glass	26 cases (for house with roof pitch of 30 degrees)
Top ventilators	14 to 18, each 3 panes wide *
Side ventilators	10 to 14, each 3 panes wide
Doors	1 each end, 3ft. 6in. x 6ft. 6in. high
Shingle and sand	10yds.
Cement	25 bags
Paint	4 gallons
Putty	1½cwt.
Nails	30lb. of 3in., 5lb. of 4in.
Brass boot rivets for glazing	5lb. of ¾in. flat heads
Bolts	6 dozen 6in. x ½in.
Door hinges and locks	2 sets
Ventilator hinges	2 9in. T hinges for each vent
Damp course	3 gallons of tar, 3 bags of sand
Piping for operating top vents	200ft. of 1in.
Piping for operating side vents	200ft. of 1in.
Vent-operating gear	1 set for each vent up to 4ft. long, 2 sets for each longer vent

The roof and side wall sash bars and the sash bars for the ends of the houses are not included in these quantities, as the pitch of the roof determines their lengths, and the numbers of pieces required have been given in the measurements of these houses.

The quantities of materials required for a glasshouse 50ft. x 15ft. have not been included, as they can be worked out readily from those given for the 100ft. x 15ft. house.

seem to open them, and only in the more sheltered, hot positions are they ever used. The total length of side ventilation required appears to be equal to about a third of the length of the house on each side. The side ventilators should also be constructed of wood and glass so that they do not cast shade.

Some device for opening and closing a number of ventilators at once is necessary to save time. In the past most growers have had all the ventilators on one side of a house fastened to one opening device, but some growers are now connecting only half the length of each side of the house to each control. They find this an advantage in some winds, as they can then open the ventilators on one side and at one end of the house only. Moreover, the piping to which the vents are connected twists if the strain is too great, with the result that those at the end of the house furthest from the operating gear need very careful adjustment and tend not to open fully.

The rack and pinion is the best type of mechanical device for operating the ventilators but is expensive to install. Several different types of metal elbow joints are quite satisfactory and easily made by the grower.

Doors

Double hanging doors fitted to both ends of the wider houses are most satisfactory, as they allow entry of a small truck or tractor and trolley for changing the soil if necessary. The door on the north end of the house should be glazed at least to within 2ft. of the ground, as wooden double doors 7ft. wide by 6ft. 6in. high shut out too much sunlight.

In houses built in a north and south direction the south end, including the doors, may be made entirely of timber, but in houses running east and west both ends should be fully glazed.

Painting

In all places where 2 pieces of timber meet they should be given a coat of paint before being secured in position. After the framework is finished, 2 coats of white lead paint are necessary before glazing is begun. As an alternative, a coat of priming may be applied before the frame is built and a coat of white paint after it is up.

Glazing

Usually the glass will be found to have a slight curve in it, and care must be taken that all panes are set with the curve the same way.

The amount of lap depends on the size of the glass and the rigidity of the house, but it should always be as narrow as possible. Generally from ⅛ to ¼in. is allowed for laps on the roof, but on the side and end walls the glass is frequently placed with the ends butted together. With a lap of more than ¼in. the lapped place becomes dirty and is another source of loss of light.

Each run of glass from the top plate to the ridge is completed before the next run is begun. The putty is placed in the appropriate rebates and, starting at the bottom, the glass is pressed down firmly and secured in position with ¾in. flat-head brass boot rivets, 2 at the bottom of each pane, 2 ½in. up from the bottom edge, and 2 halfway up the pane. All excess putty is then scraped off down to the level of the glass, as no putty is left over the glass as in the glazing of dwelling-house windows.

For further information about the construction of glasshouses intending growers should communicate with the district Orchard Instructor, who will be able to give more detailed information about local conditions.

MANAGEMENT OF THE IN-PIG SOW

IN the production of a good litter of pigs at weaning careful management of the in-pig sow from the time she is mated until she farrows is more important than care of the litter after birth. In this article I. H. Owtram, Extension Officer in Pig Husbandry, Department of Agriculture, Wellington, outlines the major points of management of the in-pig sow, attention to which can be the means of producing larger litters.

In-pig sows should have access to pastures at all times.

MANY pig producers do not realise that a pig when weaned is not 56 days old, but is 171 days old. A litter of pigs starts its development from the date on which the sow is mated and not on the day on which the litter is born. Management during those 171 days is therefore of vital importance in producing a really good litter of pigs at weaning time. "Well weaned is more than half grown" as far as pigs are concerned, and the proper care of the sow during the first 115 days is even more important than the care of the litter during the next 56 days.

The practice of turning sows out to fend for themselves as soon as they are mated and then getting them in a month before they are due to farrow and feeding them up is simply locking the stable door after the horse has gone. Good feeding during the last month is certainly necessary, as it is during that period that the unborn litter increases in weight most rapidly, but by that time the number of pigs in the litter has reduced to 6 to 8 piglets, whereas it is known that the average number of live embryos in a litter a fortnight after mating is from 18 to 20.

Proper management of the sow from the time of mating will produce more pigs per litter.

Restoring Lost Weight

Nearly all sows will have lost a good deal of weight by the time their litters are weaned, and that weight must be put back on to them after mating. This is the secret of producing big litters. A mature sow should gain from 75 to 100lb. weight during the time she is carrying a litter. This is about the equivalent of the loss in weight at farrowing, which is up to 45lb., plus the loss in weight while she is suckling the litter, which is from 40 to 50lb. A maiden sow should gain rather more than this, as in her case allowance must be made for the fact that she is still growing.

An in-pig sow should get from 6 to 8 gallons of skimmed milk or its equivalent per day, together with 1lb. of meat meal and access to good pasture at all times. The provision of pasture is most important. Grazing sows on lucerne, where it can be grown, is an excellent practice. It is from good clover pasture or lucerne that a sow will obtain the minerals she requires in a form that is easy to assimilate and also the vitamins that are essential to the development of the litter.

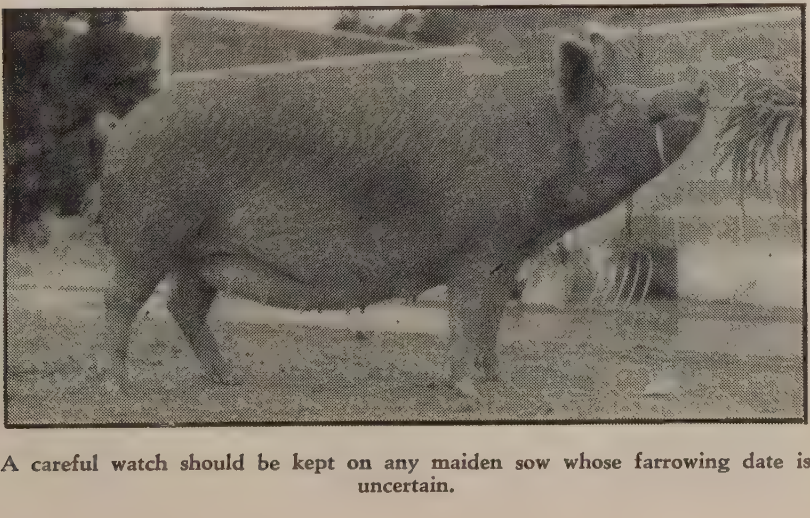
In the autumn and early winter, when pasture growth is at a minimum, the addition of a fish-oil supplement to the ration is recommended. As at this time of the year practically no dairy by-products are available and the ration is generally largely made up of root crops, it is more than ever necessary to feed some concentrates in the form of meat meal and, if it is possible, grain (maize or barley) or grain meal. The feeding of $\frac{1}{2}$lb. of tallow per day during this period is also a great help.

Sleeping Quarters

A warm, dry place for the sows to sleep, which need not be elaborate or costly, must be provided. In fact the old idea of putting a shelter for the dry sows for the winter under a haystack when the stack is being made has much to commend it. It is easy to do, and need consist of only a framework of good, strong logs supported on posts about 4ft. high. The stack is built right over it, and one side, facing to the north or north-east, away from the prevailing bad weather is left open.

Sows must be put into their farrowing quarters at least 3 weeks before they are due to farrow, and as most sows farrow their spring litters in the May-July period, they do not interfere with the feeding out of the hay in any way.

Careful observation by the farmer is a very important aspect of pig production and is just as important with dry sows as with any other pigs. Plenty of room should always be allowed in the sleeping quarters and at the trough. This stops much fighting and jostling and allows the "boss" sow, and there



A careful watch should be kept on any maiden sow whose farrowing date is uncertain.

always is one (the boar is not the boss), to do her "bossing" without doing any harm to the others. If, as is frequently the case with maiden sows, the farrowing date is only approximately known, a careful watch must be kept to ensure that the sows are put into their farrowing quarters in good time.

Provision of Drinking Water

Another point of great importance and one often neglected is the provision at all times of good, clean drinking water. The belief that pigs do not require water to drink because the bulk of their food is liquid is entirely wrong, particularly with in-pig and milking sows. In all probability the failure of sows to produce an adequate milk supply after farrowing is mostly due to lack of good drinking water. A water trough must be provided for dry sows in the paddock in which they are running.

More pigs can be produced per litter and pig production thereby increased by:—

1. Careful management during the important period of the first 115 days of a litter's life.
2. Feeding in-pig sows well all the time they are carrying litters.
3. Providing good drinking water and a dry, warm place for sows to sleep.
4. Putting sows into their farrowing quarters in good time before they are due to farrow.

Radio Broadcasts

RADIO talks to farmers will be given from Station 1YA Auckland at 7.15 p.m. on the following dates:—

July 6—"Current Farming Problems for the Month," by K. M. Montgomery, Fields Instructor, Department of Agriculture, Te Kuiti, and A. J. Price, Fields Instructor, Department of Agriculture, Te Awamutu.

July 13—"Modernising an Old Farm Residence," by Eva Topping, Rural Sociologist, Department of Agriculture, Auckland, and Mrs. Harding, Papatoetoe.

July 20—"Problem of Bloat in Dairy Cows," by P. J. McCann, Veterinarian, Department of Agriculture, Hamilton.

July 27—Young Farmers' Clubs' session by the Auckland Central District Committee.

The following broadcasts will be made from 4YA Dunedin after the stock session at 7 p.m. on the dates shown:—

July 13—"Deficiency Diseases of Stock in Otago and Southland," by I. M. Cairney, Veterinarian, Department of Agriculture, Dunedin.

July 27—"Notes on Successful Beekeeping," by I. W. Forster, Apiary Instructor, Department of Agriculture, Oamaru.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 2YA Wellington on Thursdays at 12.35 p.m., and 3YA Christchurch on Mondays at 12.20 p.m.

Classification of Chemical Weedkillers

THE following lists have been prepared to give farmers, horticulturists, and other users of chemical weedkillers an indication of the materials of this class available at present and the relationship between these preparations. They have been compiled with the assistance of the New Zealand Agricultural Chemical Manufacturers' Federation. No claim is made that these lists are complete, but supplementary lists may be added as new materials are introduced on the New Zealand market.

THE exact chemical relationships of these substances are a subject for a chemical journal rather than "The Journal of Agriculture," and the classification that has been adopted is not necessarily correct in all details.

Full recommendations for the use of most of these materials appeared in the "Journal" for November, 1948. That article gave a compilation of reports from research workers in weed control throughout the Dominion. Further experimental results will be published from time to time in the "Journal."

PETROLEUM OILS AND RELATED PRODUCTS

The large number of by-products of this nature from industrial manufacture includes gasolines, naphthas, fuel oils, kerosenes, and waste oils. Fertona Carrot Selective is 100 per cent. light petroleum distillate.

2, 4 DINITRO-ORTHO-CRESOL (D.N.O.C.) AND CRESYLATES

These are organic materials that have particular value in the control of weeds in peas and onions (which are susceptible to hormone weedkillers) and in the control of certain weeds resistant to the hormone materials.

Class of weedkiller	Proprietary name	Percentage of D.N.O.C. salt	Form of weedkiller
Sodium salt	Selectone	30	Solution
Sodium salt	Sinox	30	Solution

HORMONE OR PLANT-GROWTH REGULATING TYPES OF WEEDKILLERS

The majority of these are derivatives of 2, 4-D (2, 4 dichlorophenoxyacetic acid) or M.C.P. (2, methyl, 4 chlorophenoxyacetic acid). The esters when sold in solution are usually oil based, the amines in water solutions while metallic salts are most often in the form of dry powders.

Class of weedkiller	Proprietary name	Percentage of acid equivalent (2, 4-D or M.C.P.)	Form of weedkiller
Ethyl ester	Weedone Standard	9.67 2, 4-D	Solution (oil based)
Ethyl ester	Weedone Concentrate 57	35.2 2, 4-D	Solution (oil based)
Ethyl ester	Weedust 2	1.8 2, 4-D	Powder (talc base)
Ethyl ester	Weedust 5	4.51 2, 4-D	Powder (talc base)
Ethyl ester	Weedust 15	13.54 2, 4-D	Powder (talc base)
Ethyl ester	Weedust Concentrate	30.06 2, 4-D	Powder (talc base)
Isopropyl ester	Stantox P-44	37 2, 4-D	Solution
Isopropyl ester	Stantox P-44 Dust	4.2 2, 4-D	Powder
Amine	Weedar 77	41 2, 4-D	Solution
Amine	Dee Cee Pee	12.5 2, 4-D	Solution
Amine	Ataweed Weedicide	12.5 2, 4-D	Solution
Amine	Stantox 2, 4-D Liquid	18 2, 4-D	Solution
Sodium salt	Frenokone	72 2, 4-D	Soluble powder
Sodium salt	Sodium, 2, 4-D	72 2, 4-D	Soluble powder
Sodium salt	Dee Cee Pee or Ataweed Powder	70 2, 4-D	Soluble powder
Sodium salt	Stantox Powder	83 2, 4-D	Soluble powder
Sodium salt of M.C.P.	Agroxone Liquid	10 M.C.P. salt	Solution
Sodium salt of M.C.P.	Agroxone Dust	5 M.C.P. salt	Powder
Sodium salt of M.C.P.	Tuloxone	10 M.C.P. salt	Solution
Unspecified 2, 4-D	2, 4-D Selective Weedkiller		

INORGANIC WEEDKILLERS

In general these preparations may be considered non-selective, and they affect a wide range of plant species. A large number of them includes the following:—

Class of weedkiller and percentage of active ingredient	Proprietary name	Form of weedkiller
Sodium arsenite 99	Meta Sodium Arsenite Powder 99%	Powder
Sodium arsenite 56	Cooper's "Weedicide"	
Arsenical base	Surekyl Weedkiller	
Sodium arsenite	Murton's Arsenical Weed Killer	Solution
Sodium arsenite	Murton's Blackberry Destroyer	Solution
Sodium chlorate 60	Atlacide SF	Soluble powder
Sodium chlorate 60	Atlacide NF	Soluble powder
Sodium chlorate 100	Sodium chlorate	Soluble powder
Ammonium sulphamate	Ammate	Soluble powder

CANDY AS EMERGENCY FOOD FOR BEES

By R. S. WALSH, Apiary Instructor, Department of Agriculture, Auckland.

UNDER normal conditions any form of supplementary feeding should be unnecessary if the bees' requirements of store honey have been adequately met at the close of the season. In the Auckland district the safety margin is 50lb. of stores per colony. Apiaries today are almost completely Italianised, and stores of 40lb. as previously recommended when apiaries were stocked largely with black bees are not sufficient for the more vigorous Italians.

HOWEVER, in this district a normal winter is rarely followed by an equally normal spring. Two years ago there was an exceptionally late autumn followed by an extremely-mild early winter; consequently colonies continued to breed at a high rate with heavy consumption of stores right into June. The effect of the unseasonal weather on nectar-bearing plants, particularly manuka, further aggravated the position, as the light resultant flow yielded no surplus but greatly stimulated breeding. Beekeepers were compelled to resort to artificial feeding as early as July.

Much unsettled weather is experienced in the narrow area comprising the Auckland apiary inspection district. Seldom during September, October, and November is there a relatively-unbroken period of calm weather. The period usually consists of short spells of good "bee weather" followed by high cold winds, low temperatures, and rain. Nectar-bearing flora is abundant in the spring, but its value to the bees is greatly restricted through low temperatures preventing the secretion of nectar in pasture plants and cold winds similarly affecting scrub and bush sources, while the many wet days confine the bees to their hives for varying periods.

Sugar Syrup Feeding

Colonies are fed sugar syrup to keep them going until more prolonged periods of settled weather permit the bees to store some honey. Usually, however, this slight surplus is consumed by bees and brood during the period of broken weather, and further feeding becomes necessary. Although temperatures may prevent nectar secretion and rain and wind restrict the bees to the hives, the temperature seldom drops to a level where brood rearing is retarded; consequently little honey or sugar syrup can for long be stored in the combs, but is used to raise young bees.

A great many beekeepers feed the bees too thin a syrup, and although each colony may receive a large volume of liquid, there is little sugar in the mixture, and it is the sugar on which the bees rely for sustenance. The practice of feeding thin syrup has another disadvantage in that it acts as a stimulant inducing the bees to breed at an increased rate. Colonies in this district do not require stimulation; if they are given sufficient stores, whether of honey or heavy syrup, they will build up in ample time to meet the main honey flow.

Dry Sugar Feeding

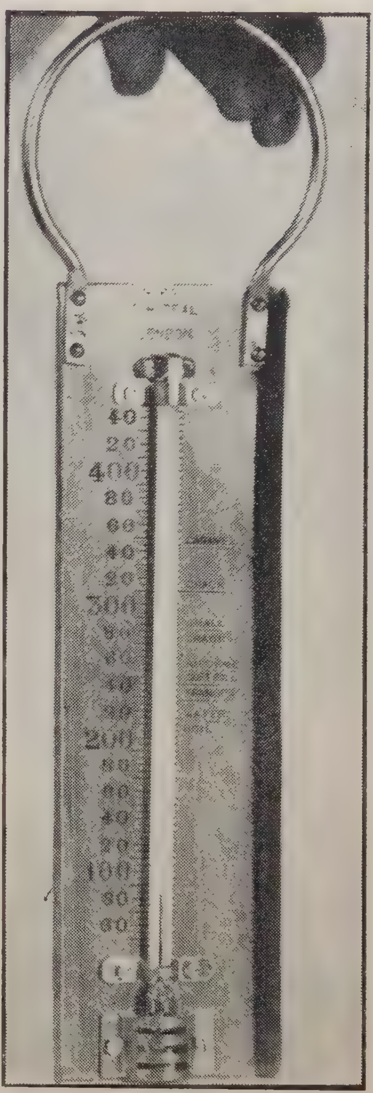
A few beekeepers who are aware of the dangers of stimulation, yet realise the necessity of assisting the bees when stores are low, have resorted to feeding dry sugar. The sugar is either placed at the rear of the bottom board or over the mat. This practice has given satisfaction, but it is realised that to some extent it is wasteful, as a proportion of the sugar is carried by the bees outside the hives.

Candy Feeding

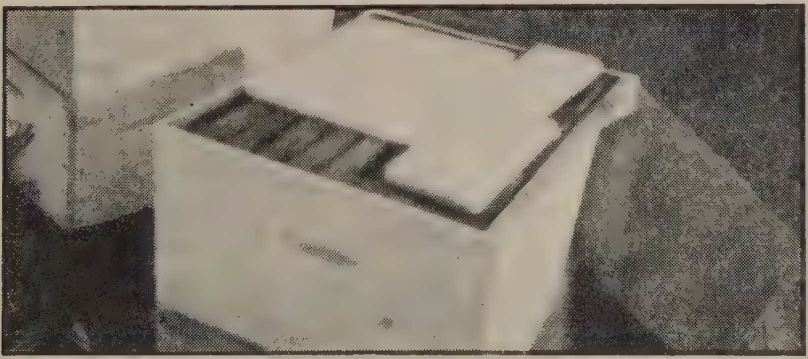
Candy has been fed to bees since the earliest days of commercial beekeeping. Of recent years it has gone out of fashion, probably because of the work involved in making the candy and the difficulties experienced in preparing a satisfactory article that would resist all climatic changes without softening.

Candy feeding should be regarded as a purely emergency measure, but it has definite merit in a district such as Auckland, where bees must be fed at any time from mid-winter until mid-November and excessive stimulation must be avoided.

Candy feeding is perhaps impracticable for the commercial beekeeper, but should be suitable for beekeepers operating up to 50 colonies. A confectionery firm in Auckland estimated that the candy could be manufactured in quantity at 1d. to 1½d. per lb. While this sum added to the price of the sugar used would not place a prohibitive cost on the finished product to small beekeepers, commercial beekeepers may consider the cost excessive. However, it would be possible for large beekeepers to use candy, if warranted, by obtaining bulk supplies from a confectionery-manufacturing firm.



[*Sparrow Industrial Pictures Ltd. photo.*
A confectioner's thermometer, the use of which is essential for the correct making of candy.



Method of feeding candy to the hive. The use of thin slabs allows a flat lid to be placed directly on top. If thick slabs of candy are used, an extra half-super must be put on to accommodate them, unless the hive has a gable roof.

CANDY AS EMERGENCY BEE FOOD . . .

A minor experiment carried out by the writer suggests that further experience may indicate that candy feeding as compared with sugar syrup feeding is so economically superior that the use of candy manufactured commercially may have practical possibilities for the larger beekeeper.

Results of Experiment

Two colonies in a suburb of Auckland were selected in late February for the candy-feeding experiment. Both hives were of normal strength and possessed young autumn-mated queens.

The hives, each of which contained 40lb. of honey as winter stores, were closed down in March and were not disturbed until July 1. On this date all honey with the exception of 3lb. per colony was removed. The bees completely filled the top super in each hive and covered five frames of brood. Both hives were supplied with 7½lb. of candy placed above the food chamber and directly under the mat. The hives were left undisturbed until the end of August, when they were again examined.

The blocks of candy had almost disappeared, and upon examining the combs it was evident that some of it had been converted and stored in the combs around the brood, of which there were three frames. Bee strength appeared to have been maintained. Each colony was again given a supply of candy, on this occasion 7lb. per hive.

The next examination took place on October 15. A little candy (about 1lb. per colony) remained unconsumed in each hive. The bees had evidently been bringing in fresh nectar, as a small amount had been stored. The area of brood was still confined to three frames per hive, most of which had recently hatched, as the cells were filled with eggs and young larvae. Bee strength appeared little affected, and bees covered every frame in the food chamber.

No further candy was supplied and the hives were not again disturbed until early November. The preceding month had been boisterous and cold with few days on which the bees could leave the hives. There had evidently been some mortality among the bees, as both hives were somewhat weaker. However, there were still three frames of brood and a little nectar in the combs.

From this date, with an improvement in the weather, the bees made rapid progress and by early December were reasonably strong colonies.

Colony returns during the season were 60lb. surplus from one hive and 65lb. from the other.

The hives were under a hawthorn bush which denied them maximum sunshine, but they received protection from cold winds. During the spring the bees had access to a great deal of nectar-bearing flora not found in open country. This was, however, offset by the extremely bad weather during the period of the experiment.

Although definite conclusions could not be reached on a single small-scale experiment, it has been sufficient to indicate to beekeepers with only a few hives that candy fed as an emergency food is superior in this district to sugar syrup and less costly.

Commercial Beekeeper's Opinion

A few pounds of prepared candy was sent to a commercial beekeeper in early November when the hives were denuded of natural stores and little if anything was being gathered. For some time previously the beekeeper had been feeding dry sugar. Four hives were selected; two were fed 1lb. of candy on three occasions and two others were each given 2lb. of dry sugar for the same periods. The beekeeper reported that he was surprised at the manner in which the bees were able to consume the rock-like candy. The process took much longer than the assimilation of dry sugar, yet the effort required of the bees appeared no greater. It took 2lb. of dry sugar to maintain the hives fed in this manner for the same period as the other hives were maintained on 1lb. of candy.

His conclusions, naturally reserved on so restricted and short a test, were that candy feeding was much more economical than dry sugar feeding and infinitely more so than sugar syrup feeding, and the wear and tear on the bees no greater.

Recipe for Making Candy

Unless every particular is most carefully observed in the making of candy, failure is almost inevitable. The writer endeavoured to make a satisfactory candy by the methods advocated in text-books on beekeeping, but without success. It may have been that some essential point was overlooked, but it was not until an expert sugar boiler was consulted and his advice followed that success was achieved.

Various methods of testing the candy when it reaches the crucial point in its preparation will be found in beekeeping publications, but it is only by the use of a confectioner's thermometer that the temperature at which the candy is cooked can be gauged. These thermometers can be bought at small cost from firms dealing in scientific instruments.

The following are the ingredients used in the preparation of candy:—

20lb. of 1A sugar
1 level teaspoonful of cream of tartar
2 pints of water

The water is first put into the pan, the cream of tartar next, and the sugar last. The pan and its contents are placed over a slow fire and vigorous stirring begun immediately. Stirring continues until the confectioner's thermometer shows that the mixture has reached 245 degrees F., at which point the candy is made.

The mixture should be removed immediately from the fire and stirring continued for 10 minutes before it is poured into moulds. If the candy is poured into the moulds before it is sufficiently cool it will not harden properly. For this reason an ordinary washhouse copper is unsatisfactory as a boiler, as the bricks in the fire-box retain the heat too long after the fire has been raked out and the candy is invariably poured into the moulds before it has cooled sufficiently.

Too much emphasis cannot be placed on the importance of using the correct amount of cream of tartar, observance of the correct temperature of 245 degrees F., and sufficient cooling and stirring of the mixture before it is poured into moulds.

◆

METEOROLOGICAL RECORDS FOR APRIL

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	58.0	— 2.0	72.0	36.0	2.90	8		1.05	11	186.6
Auckland	160	58.2	— 3.0	70.3	43.3	5.42	16	+ 1.58	1.54	10	176.2
Tauranga	10	55.0	— 3.4	70.9	37.6	3.55	11	— 1.17	0.74	10	211.8
Ruakura	131	51.8	— 3.5	70.1	29.0	5.15	17	+ 1.43	1.19	23	190.5
Rotorua	980	51.2	— 3.9	68.0	34.0	5.49	13	+ 0.98	1.75	23	167.8
Gisborne	12	54.8	— 4.0	74.9	35.9	2.04	14	— 1.39	0.54	6	190.6
New Plymouth ..	160	54.8	— 3.4	65.0	40.0	4.15	16	— 0.51	1.34	10	207.6
Napier	5	55.6	— 3.0	78.0	38.6	1.32	13	— 1.29	0.26	19	189.2
Taihape	2157	48.5	— 4.0	65.5	32.0	4.10	18	+ 1.30	0.74	25	
Wanganui	72	53.7	— 4.1	70.2	37.5	4.75	16	+ 1.51	0.89	12	176.4
Palmerston North ..	110	52.6	— 4.2	68.0	33.4	4.79	18	+ 1.42	1.02	15	145.6
Waingawa	350	51.6	— 2.3	71.0	28.5	2.60	18	— 0.31	0.94	25	159.6
Wellington ..	415	53.4	— 2.2	67.8	40.0	4.85	16	+ 1.31	2.00	25	164.2
Nelson	24	52.6	— 3.8	66.7	35.3	4.73	9	+ 1.69	1.96	23	217.7
Blenheim	12	53.0	— 3.8	72.1	33.9	2.88	8	+ 1.10	1.65	25	214.6
Hokitika	12	49.4	— 3.8	65.6	32.4	8.35	15	— 1.04	2.45	9	150.9
Hanmer Springs ..	1225	47.8	— 4.2	71.2	25.0	8.71	13	+ 5.38	3.74	25	154.2
Christchurch ..	22	51.5	— 2.0	73.1	31.2	1.28	9	— 0.56	0.51	12	159.3
Ashburton	323	51.4	— 1.0	75.0	31.2	3.44	7	+ 1.14	1.07	28	158.2
Timaru	56	51.2	— 2.0	75.5	31.2	2.88	6	+ 1.27	0.83	27	153.9
Alexandra	520	48.2	— 3.3	71.1	25.6	0.57	7	— 0.96	0.28	8	134.3
Taieri	80	48.9	— 2.4	69.0	28.3	1.84	16	— 0.55	0.70	27	
Invercargill ..	32	47.0	— 3.5	69.0	30.0	4.62	21	+ 0.56	1.00	9	53.5

Management of Dairy Cows to Reduce Spring Losses

By J. MULLINS, Veterinarian, Department of Agriculture, Masterton.

INCREASED demands for animal food products as the result of the gradual rise in world population and improved standards of living have been met by increasing the productivity of the soil so that more and better crops and herbage are produced. At the same time the ability of meat- and milk- producing animals to convert these crops into palatable and nutritious foods for man has been increased by breeding, selection, and good husbandry. The exploitation of the bovine and the increased consumption of milk and butter have resulted in the evolving of the modern dairy cow, an ambulatory factory capable of converting large quantities of feed into extraordinary amounts of milk much in excess of the requirements of its offspring. The management of dairy cows so that the maximum production is obtained and ills to which these highly-developed animals are subject in the spring are avoided is the subject of this article.

THE in-calf cow is worthy of every care. More than a maintenance diet is necessary, as a growing foetus, sharing its mother's rations, has to be nurtured. The cow's condition should be constantly maintained, but this is especially important after she has been dried off. This can be ensured only by adequate feed reserves of hay, silage, roots, and green crops. Green crops must be fed or rationed carefully, otherwise red water may occur, not infrequently with fatal conseqences. If red water occurs, a drench of common salt and molasses should be given and the cows disturbed as little as possible. Plenty of hay or a good run-off must be available when green crops are fed.

Good Condition, Not Fatness

Hay and/or silage of good quality and rough grazing are normally sufficient to maintain in-calf cows in good health and condition during pregnancy. Close shelter is invaluable in cold, rough weather. Good condition, not fatness, should be the aim; over-conditioned cows are more predisposed to milk fever. On the other hand, loss of condition at this time is a serious matter, for obvious reasons. Cows lacking condition face parturition and lactation at a great disadvantage; they produce underweight calves and are themselves subject to the many ills and dangers awaiting the debilitated, apart from their inability to take adequate advantage early in the new season of the chance to build up healthy condition again. Normally it may be said that the average dairy cow in New Zealand requires about 15cwt. of hay during winter.

The nature of the season, of course, will have an influence both on the amount of supplementary feed required and on the amount of feed available for saving, but the winter must always be kept in mind and budgeted for.

Dangers of Damaged Hay

Poor-quality, over-ripe, washed-out hay is almost worthless, and damaged, mouldy hay may be harmful. Much-weathered hay loses most of its feeding value and is lacking in minerals and vitamins, deficiency of which may predispose to many troubles. A high incidence of abortion, weakly calves, and outbreaks of fatal bacterial scours in calves have been observed where in-calf cows had to subsist largely on damaged hay, which is indirectly responsible for their lowered resistance. An adequate, balanced diet is necessary for good calving and well-developed, relatively disease-resistant calves.

HEADING PHOTOGRAPH: The good dairy herd management on this Okato, North Taranaki, farm is evident in the ample reserves of hay, from which the cows are being fed, the rough grazing, and the close shelter provided by the boxthorn hedges.

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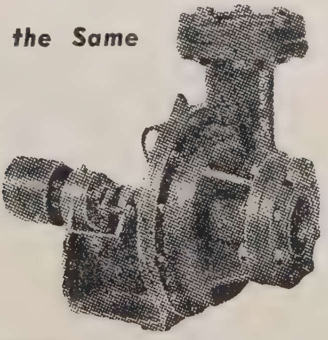

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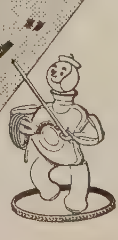

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Ergot in Hay Crops

In some seasons the seed in a hay crop, particularly if it is ryegrass hay, may be heavily infested with ergot; blackish, spur-like growths on the seed betray an ergotised crop. Feeding such hay has caused serious disability and loss in cattle. Swelling of the legs and in severe cases sloughing of the feet or part of a limb are very obvious symptoms of ergotism. Nothing can be done for affected cases apart from administering a laxative and providing other feed. Ergot also affects other grasses, notably tall fescue, which must be regarded as a poison for stock at all times, as the leaf also has an ergotising effect. This type of ergot must not be confused with paspalum ergot, which has not this effect on the extremities, but instead produces an inco-ordination of movement, and sometimes affected animals may go down temporarily. Removal of cattle from ergotised paspalum soon results in complete recovery.

Abortion No Longer a Menace

Contagious abortion was a serious disease of the in-calf cow and the cause of enormous loss to the dairy industry in the past. As a result of calfhood vaccination (and vaccination of the cows themselves when necessary) against this disease, the position today is greatly altered and contagious abortion is no longer the menace that it was. Incidentally, eating of macrocarpa foliage may cause abortion in cows.

Metabolic Diseases

The assimilation by recently-calved cows of quantities of highly-lactogenic feed (feed stimulative of milk production), such as immature, rapidly-growing spring grass, may bring about a lowering or throwing out of balance of mineral levels in the bloodstream, with consequent serious body disturbance and the onset of metabolic diseases. It is a wise precaution to avoid over-stimulation of recently-calved cows and those close to calving. While an unknown factor or factors may still operate, the theory that excess immature grass predisposes to milk fever, grass staggers, and acetonaemia in the cow may be well founded.

These metabolic diseases, with which many owners are now familiar, are more usual after calving, though occasionally they occur before calving.

Milk Fever

Milk fever (hypocalcaemia), to which the heavily-producing and high-conditioned cow seems more prone, is due to a severe drop in the amount of calcium in the blood a day or two after calving. Staggering is first evidence of an attack and the cow soon goes down; coma and death follow if the cow is untreated. The artificial raising of the amount of calcium in the blood by injecting this mineral into the bloodstream repairs the deficiency, allowing sufficient calcium for the body to carry on till the glandular mechanism responsible for maintaining a steady supply to the circulation operates again. There are ample calcium reserves in the body as a whole, chiefly in the bones. Inflation of the udder has in the past given good results and still does, but danger of introducing infection is always present. The temporary suppression of milk secretion is probably in part at least responsible for the curative effects of inflation.

Grass Staggers

Uncomplicated grass staggers, which occurs more usually a few weeks after calving, is characterised by excitability, staggering, and convulsions. A lowering of the magnesium content of the blood is responsible for grass staggers, and the injection of magnesium in the form of an Epsom-salt solution is effective, though its action is not nearly as specific or spectacular as is that of injection of calcium in milk fever cases. Inclement weather and possibly indigestion seem to be precipitating factors in this troublesome disease, from which losses may be heavy.

Acetonaemia

Acetonaemia (presence of acetone in the blood) is another post-calving trouble; in it nervous symptoms may also be evident, but are not necessarily diagnostic of this disease only. A combination of these three diseases may occur in the freshly-calved cow, greatly complicating and aggravating the position. A digestive type of acetonaemia is not unusual some weeks after calving; it causes inappetence, loss of condition, and sometimes staggering. The logical treatment for this condition is the administering of sugar, such as molasses, by the mouth daily. Small doses of chloralhydrate also give good results.

Sufficiency of Mature Feed

As these metabolic diseases are thought to be associated with over-stimulation of the milk-producing organs by immature feed, good management may be the best preventive. A sufficiency of mature autumn-saved feed before and for some weeks after calving should be assured. When the spring grass begins to come away cattle should be turned on to mature feed; saved-grass supplements should still be fed too till the danger period is passed and the new growth is fairly mature. Molasses as a lick or added to the hay may be a help. Mature feed and saved-grass supplements have not the stimulative properties of young grass and should be relatively safe at this critical time for the dairy cow.

A freer range, affording more opportunity for discrimination and selection of herbage, and less forcing and precision grazing, though clashing with standard practices, may have a compensatory influence in the reduction of spring troubles and losses. For instance, there are dairy farmers who consider that opening a number of paddocks to the herd is the best preventive of bloat.

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during April and for the 9 months ended April 30, 1949, with comparative figures for the same month and 9-monthly period of last year, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER—

		Tons			Tons
Period	Creamery	Whey	Total	Percentage inc. or dec.	Total in store at end of mth.
April, 1949	9,360	212	9,572	+ 42.780	29,295
April, 1948	6,543	161	6,704	—	36,398
Increase or decrease	+ 2,817	+ 51	+2,868	—	— 7,103
For 9 mths. ended 30/4/49	137,050	2,483	139,533	+ 9.532	—
For 9 mths. ended 30/4/48	125,145	2,245	127,390	—	—
Increase or decrease	+ 11,905	+ 238	+ 12,143	—	—

CHEESE—

		Tons			Tons
Period	White	Coloured	Total	Percentage inc. or dec.	Total in store at end of mth.
April, 1949	7,248	556	7,804	+ 32.428	19,238
April, 1948	5,893	—	5,893	—	11,368
Increase or decrease	+ 1,355	+ 556	+ 1,911	—	+ 7,870
For 9 mths. ended 30/4/49	82,984	4,753	87,737	+ 12.175	—
For 9 mths. ended 30/4/48	78,214	—	78,214	—	—
Increase or decrease	+ 4,770	+ 4,753	+ 9,523	—	—

If these figures are converted into butterfat equivalent, there is an increase of 10.117 per cent. in butterfat graded for the 9 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

Pig Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in June as follows:—

Auckland—1YA, on July 26, at 12.35 p.m., "Topical Discussion," by H. E. Clark, Supervisor, Auckland District Pig Council.

Wellington—2YA, on July 21, at 12.35 p.m., "Weaning to Four Months Old," by I. H. Owtram, Extension Officer in Pig Husbandry, Department of Agriculture, Wellington.

Christchurch—3YA, on July 21, at 7.15 p.m., "Questions and Answers," by H. W. McIntosh, Supervisor, Canterbury District Pig Council.

LARGE-SCALE ONION PRODUCTION

Upper left—Topping, sorting, and bagging onions. Upper right—Aerial photograph of Mr. E. Lay's property at Mangateretere showing storage sheds in the middle distance. Middle left—Flower heads of Pukekohe Long Keeper onions grown for seed. Middle right—Spraying with D.N.O.C. and cultivating, in one operation, for weed control. Lower—Loading onions on to a trailer.

[News-photo Service photos.

ONION GROWING IN HAWKE'S BAY

Methods Employed for Large-scale Production on Mangateretere Farm

ONION growing in Hawke's Bay has proved successful and profitable when modern methods of culture are used. In this article R. Viney, Orchard Instructor, Department of Agriculture, Hastings, describes the practices employed by the largest grower of onions in the district, Mr. E. Lay, of Mangateretere, on the Heretaunga Plains, who last season grew 90 acres, yielding 10 to 16 tons per acre.

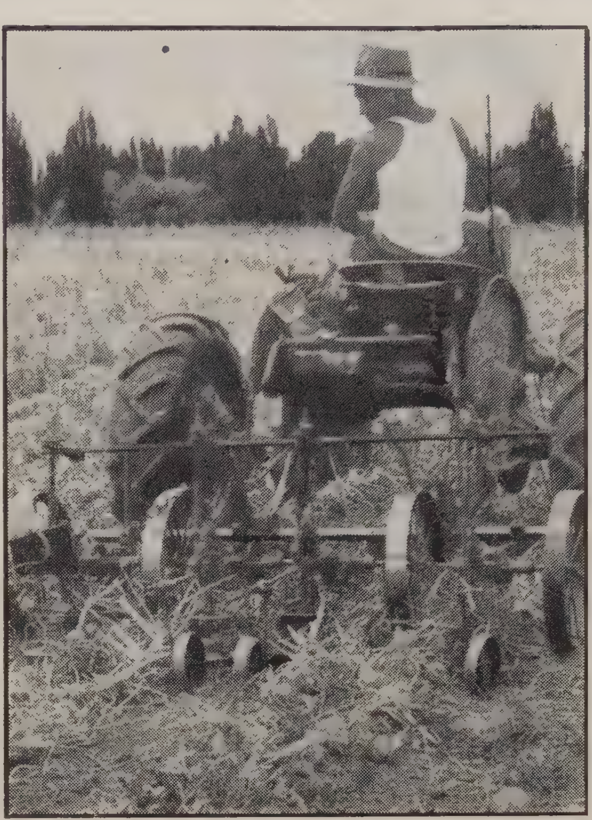
THE soil on Mr. Lay's property is mainly fine sandy loam. A cover crop of ryecorn planted in March is ploughed in during winter and the ground then lies fallow until just before planting, in spring. A dressing of equal parts of superphosphate and bone fertiliser is applied at the rate of 5cwt. per acre and the soil is disced, harrowed, and rolled several times until a very fine tilth is obtained and a firm seed-bed established for planting.

Cultivation and Spraying

Pukekohe Long Keeper seed is sown, using a 4-row seed sower, at the rate of 16 seeds to the foot. Rows are 14in. apart and by sowing at the rate given no thinning of plants is necessary. Inter-row cultivation and spraying with D.N.O.C. (dinitro-orthocresylate), 1 gallon to 80 gallons of water, are carried out—in the one operation—three or four times during the season to control weeds. Two copper tanks are mounted on the tractor to hold the spray and a small pump, which is driven by the tractor power take-off, forces the liquid through nozzles directed on to the ground. All fittings used for spraying are of brass or rubber, as the D.N.O.C. solution, being an acid, would quickly corrode other fittings. The weed spraying nozzles are mounted directly in front of the cultivating tines, so that after the weeds have been sprayed with the D.N.O.C. solution the ground is cultivated between the rows of onions. The method of weed control is very satisfactory, but it is still necessary to hand hoe the area two or three times during the season to remove weeds which may have developed.

[*News-photo Service photo.*

Onions being placed in cases.



[*News-photo Service photo.*

Harvesting onions with a mechanical puller.

Disease and Pest Control

Onion thrip is the most troublesome pest of onion crops in Hawke's Bay and as heavy infestations can reduce considerably the yield of onions by weakening the foliage, it is necessary to maintain regular spraying during summer to control the pest. A solution containing nicotine sulphate (1 gallon to 500 gallons of water) plus D.D.T. wettable powder (10lb. to 500 gallons of water) is sprayed on plants, at the rate of 100 gallons per acre, every 2 weeks from when the thrips are first noticed.

The spray gives reasonable control, but it must be applied when the first thrips appear.

Harvesting

Onions are harvested with a mechanical onion puller which lifts 4 rows simultaneously. After the bulbs are thoroughly dried they are picked up by hand labour and placed in boxes. The onions selected for long storage are put in boxes in large airy sheds on the property; the others are immediately put through the topping and bagging machine and are then ready for marketing.

The topping and bagging machine, which is driven by a belt from the tractor pulley, may be hauled to any place in the field, or in wet weather it may be operated in any of the storage sheds. This facilitates the handling of the crop and eliminates a great deal of cartage. With 11 operators the topping and bagging machine is capable of handling 3cwt. of onions per minute or 9 tons per hour.

Acknowledgment

The writer wishes to acknowledge the assistance given by Mr. Lay in supplying details of his methods.

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Inheritance by Poultry of Factors Affecting Egg Production

THE broad principles of breeding and the phenomenon of sex linkage in poultry were described in the two previous articles in this series on poultry breeding by F. C. Bobby, Superintendent of the Poultry Industry, Department of Agriculture, Wellington. This article deals with some of the practical aspects of inheritance, including information obtained by research work and now of importance to poultry breeders.

POULTRY are made up of numerous characters, visible and invisible. Many, including those associated with plumage colour and the type of a bird, are of particular interest to the fancier who breeds for show purposes, but many other characters are of vital importance to the commercial poultry producer, among them egg production, egg size, hatchability, and other factors of economic importance.

It has been stressed that the science of breeding is complex and that, though definite principles of breeding may be laid down, there are no simple rules of mating or breeding practice which may be applied to all desirable characteristics of poultry. Consequently it is necessary to study the behaviour of those characteristics which have an important bearing on commercial poultry farming. The inheritance of these characters covers a wide field of scientific research, but the more salient points likely to be of interest and value to commercial producers will be described.

Inheritance of Egg Production

For obvious reasons egg production is the characteristic in poultry of greatest importance to the majority of commercial poultry producers, but unfortunately it is not a simple genetical factor following well-defined breeding principles. Were that so it would be comparatively easy to raise the average egg production of a flock within a reasonable period.

Two aspects of egg production must receive attention: The capacity to lay eggs and the quality of the eggs laid. Both are of paramount importance to the commercial egg producer. Environment, as represented by management, including feeding, also has a marked bearing on the ability of a laying bird to produce eggs, so in this consideration of the effect of inheritance satisfactory management will be assumed.

The precise method of inheritance of egg production has yet to be discovered. A number of theories have been developed by geneticists, and these must act as a guide to an understanding of the inheritance of egg production. Information so far gathered indicates one aspect of great significance: Egg production is not a single character in itself which can be transmitted from one bird to another; apparently several inheritable characters affect egg production. They may be listed as follows:

Sexual maturity—the age at which a pullet will start to lay.

Intensity of production—the rate at which a pullet will lay.

Broodiness—the number of times a pullet will go broody.

Persistency—the continuation of laying by a pullet at the end of her first year of production.

Each of these 4 characters of a laying bird can affect the egg production of a pullet in her first laying season, and 1 or more of them may be found in a pullet. Before the full significance of these 4 characters can be appreciated, however, each must be studied in turn in the light of present knowledge.

Sexual Maturity

By sexual maturity is meant the age in days of a pullet when she lays her first egg. From a purely-economic point of view it would appear that the earlier a pullet begins to lay the less she will have cost to the laying stage and the sooner she will make a financial return to the owner, but this viewpoint must be tempered by other considerations. In practice, a bird which is hurried into production by management (a process usually referred to as "forcing") does not mature bodily to the full extent and usually produces an undue number of small eggs.

However, apart from the influence of feeding, management, or the time of year at which a pullet is hatched, there is a variation in sexual maturity among pullets, and this characteristic of sexual maturity is inherited. For example, a batch of 200 pullets may be hatched on the same day from a common mass-mated breeding pen and reared together under similar conditions. When these pullets reach the laying house it is certain that they will not all begin to lay at the same time. Three months may elapse between the date that the first pullet comes into lay and the date by which every pullet has laid her first egg, even though all were reared under identical conditions and fed similarly on arrival at the laying house.

Research into this aspect of egg production has indicated clearly that there is a relationship between sexual maturity and the total annual egg production of pullets. It has been shown also that sexual maturity can be passed on from parents to progeny, but the power to transmit this character varies with individual dams and sires.

Therefore knowledge of the age of a pullet when she lays her first egg is of value when subsequently assessing the worth of that bird as a prospective breeder. Present knowledge suggests that for light breeds and light-heavy breeds (egg-producing heavy breeds as opposed to table-bird heavy breeds) the best age for pullets to begin laying is between 180 and 200 days. Any endeavour to select the earliest-maturing birds for breeding if their age is appreciably less than 180 days tends toward a deterioration in body size and egg size.

In ordinary practice recording the sexual maturity of pullets is not easy unless pedigree breeding with a full recording system is carried out, but the ordinary breeder can take care to avoid selecting the late-maturing pullets for breeding at the end of their first year of production. Such birds can be removed from the flock as soon as most of the pullets are in lay, as they are unlikely to be economic. Alternatively, late-maturing birds can be marked with a leg band.

Intensity of Production

Where birds are trap nested or placed in single pens to obtain a record of their egg production it will be found usually that a bird lays an egg a day for a few days in succession and then misses 1 or more days. The eggs laid on successive days form what is termed a "sequence" or "clutch." It has been established that birds which lay a large number of eggs per sequence are usually the best birds on a basis of annual production. It has also been observed that the size of the sequence during the winter months is inherited. Again, there is evidence to show that winter egg production is inherited and is correlated with annual production.

Thus, birds with consistently-large sequences are carrying one of the characters required in a breeding hen. Obviously, this information can be obtained only where trap nesting or single penning is practised, but elsewhere birds which are observed to be in constant production during winter can be leg banded or marked in some other way. That entails time and patience, possibly with resort to handling birds on the perches at night, but the value of winter egg production as an inherited character should not be overlooked. Where trap nesting is carried out the birds with good sequences will be watched with interest by the keen breeder.

Broodiness

Broodiness as a factor affecting egg production is largely confined to heavy breeds; brooding is comparatively rare among pure-bred light breeds such as Leghorns, Anconas, and Minorcas. Broodiness affects egg production because as a bird goes broody she usually stops laying. Frequent broodiness among birds in a laying flock becomes of economic importance because of the loss in eggs.

Broodiness is inherited and can be reduced by careful selection in the breeding stock. It is dominant to non-broodiness and can be inherited through both sides of a mating. When, say, a Black Orpington male from a broody strain is mated to White Leghorn females which are non-broody, a high percentage of the resultant pullets show broodiness. On the other hand, if a White Leghorn male from a non-broody strain is mated to Black Orpington females of a broody strain, the female progeny show moderate or only a little broodiness.

Persistency of Production

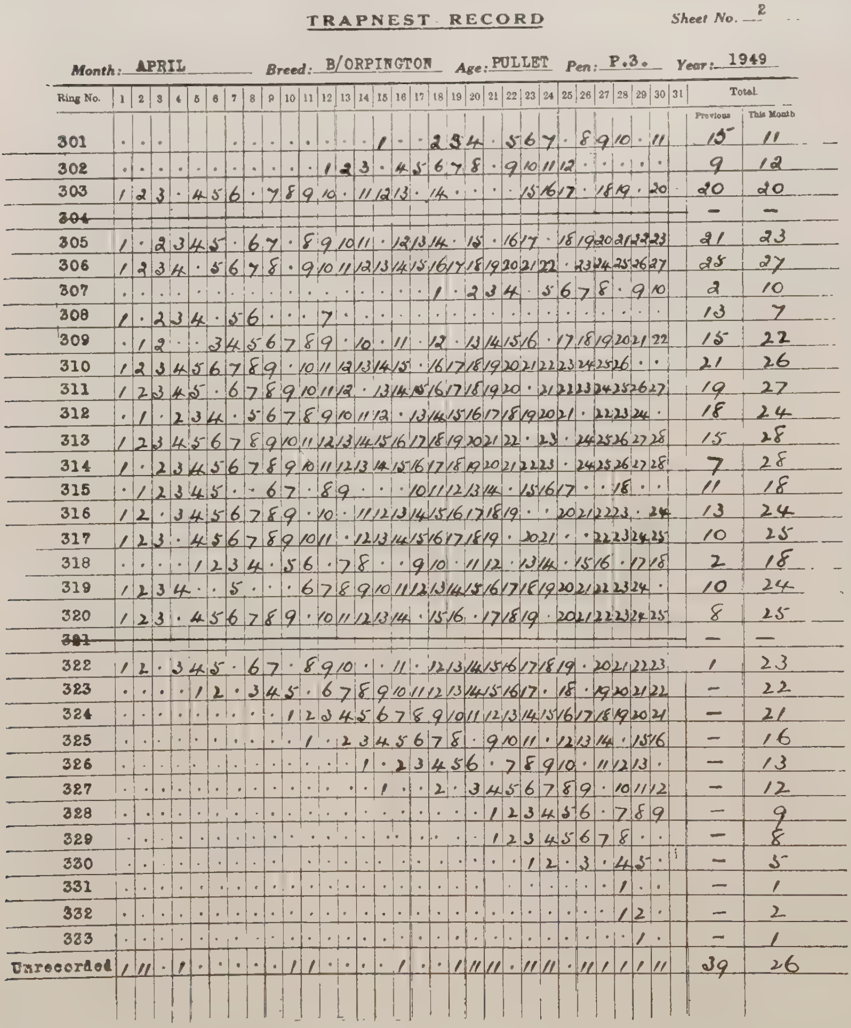
A common practice among poultry breeders is the selection of late moulters for breeding and the discarding of early moulters from the flock. Obviously, the birds which lay for the longest period during their first year of production and before their first annual moult are likely to lay the most eggs. Furthermore, late moulters usually have a shorter moulting period and return to production more quickly. In some cases birds will even continue to lay slowly throughout the moulting period.

Research workers studying this aspect of production have indicated that persistency in egg production is inherited, and it also is considered to be a dominant factor. The measuring of persistency or the determination whether a bird has persistency is not easy, but it has been suggested that a good breeding hen should have been in lay during her pullet year for not fewer than 300 days. An alternative method of determining persistency is to note the rate of production in February and March; high production in these 2 months is related to high annual production.

Pause in Production

Apart from the 4 characters described which are associated with the inheritance of egg production, some textbooks refer to a "pause in production," often called a "winter pause." These periods when egg production ceases for, say, more than 7 days are not those associated with the effects of weather, colds, feeding, or some change in management. They are considered by some research workers to be an inherited factor.

Little definite information is available on this point at present, so the winter pause has not been included with the other 4 inherited characters.



TRAPNEST RECORD *Sheet No.* 2

Month: APRIL *Breed:* B/ORPINGTON *Age:* PULLET *Pen:* P.3. *Year:* 1949

Ring No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total	
																																Previous	This Month
301	·	·	·				·	·	·	·	·	·	·	·	1	·	·	2	3	4	·	5	6	7	·	8	9	10	·	11		15	11
302	·	·	·	·	·	·	·	·	·	·	·	1	2	3	·	4	5	6	7	8	·	9	10	11	12	·	·	·	·	·		9	12
303	1	2	3	·	4	5	6	·	7	8	9	10	·	11	12	13	·	14	·	·	·	·	15	16	17	·	18	19	·	20	·	20	20
~~304~~																																–	–
305	1	·	2	3	4	5	·	6	7	·	8	9	10	11	·	12	13	14	·	15	·	16	17	·	18	19	20	21	22	23		21	23
306	1	2	3	4	·	5	6	7	8	·	9	10	11	12	13	14	15	16	17	18	19	20	21	22	·	23	24	25	26	27		25	27
307	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	2	3	4	·	5	6	7	8	·	9	10		2	10
308	1	·	2	3	4	·	5	6	·	·	·	7	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·		13	7
309	·	1	2	·	·	3	4	5	6	7	8	9	·	10	·	11	·	12	·	13	14	15	16	·	17	18	19	20	21	22		15	22
310	1	2	3	4	5	6	7	8	9	·	10	11	12	13	14	15	·	16	17	18	19	20	21	22	23	24	25	26	·	·		21	26
311	1	2	3	4	5	·	6	7	8	9	10	11	12	·	13	14	15	16	17	18	19	20	·	21	22	23	24	25	26	27		19	27
312	·	1	·	2	3	4	·	5	6	7	8	9	10	11	12	·	13	14	15	16	17	18	19	20	21	·	22	23	24	·		18	24
313	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	·	23	·	24	25	26	27	28		15	28
314	1	·	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	·	24	25	26	27	28		7	28
315	·	1	2	3	4	5	·	·	6	7	·	8	9	·	·	·	10	11	12	13	14	·	15	16	17	·	·	18	·	·		11	18
316	1	2	·	3	4	5	6	7	8	9	·	10	·	11	12	13	14	15	16	17	18	19	·	·	20	21	22	23	·	24		13	24
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318	·	·	·	·	1	2	3	4	·	5	6	·	7	8	·	·	9	10	·	11	12	·	13	14	·	15	16	·	17	18		2	18
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320	1	2	3	·	4	5	6	7	8	9	·	10	11	12	13	14	·	15	16	·	17	18	19	·	20	21	22	23	24	25		8	25
~~321~~																																–	–
322	1	2	·	3	4	5	·	6	7	·	8	9	10	·	·	11	·	12	13	14	15	16	17	18	19	·	20	21	22	23		1	23
323	·	·	·	·	1	2	·	3	4	5	·	6	7	8	9	10	11	12	13	14	15	16	17	·	18	·	19	20	21	22		–	22
324	·	·	·	·	·	·	·	·	·	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21		–	21
325	·	·	·	·	·	·	·	·	·	·	1	·	2	3	4	5	6	7	8	·	9	10	11	·	12	13	14	·	15	16		–	16
326	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	2	3	4	5	6	·	7	8	9	10	·	11	12	13	·		–	13
327	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	2	·	3	4	5	6	7	8	9	·	10	11	12		–	12
328	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	2	3	4	5	6	·	7	8	9		–	9
329	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	2	3	4	5	6	7	8	·	·		–	8
330	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	2	·	3	·	4	5	·		–	5
331	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·		–	1
332	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	2	·		–	2
333	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·		–	1
Unrecorded	/	//	·	/	·	·	·	·	·	/	/	·	·	·	·	/	·	·	/	//	//	·	//	//	·	//	/	/	/	//		39	26

A trapnest sheet, showing how eggs are laid in sequences or clutches. A bird producing consistently-large sequences is carrying one of the characters required in a breeding hen—intensity of production. The figures over the tops of the columns are the days of the month; those down the side are numbers which the birds carry on their legs. Unrecorded eggs are those laid elsewhere than in the trapnest and which therefore cannot be attributed to specific birds.

Inheritance of Egg Quality

A number of characteristics of an egg are of importance economically, among them weight, shell texture, interior quality, and colour, and there is a definite association between some of the characteristics and breeding.

Egg Weight or Size

Several factors affect egg weight or size. It has been established that there is a relationship between the body weight of a bird and egg size—the greater the body weight, the larger are the eggs produced. That is true only within any breed; it does not mean that heavy-breed birds necessarily lay larger eggs than light-breed females.

That increased egg size goes with increased body weight has been demonstrated with flocks that are accredited under the New Zealand Poultry Flock Improvement Plan. In some instances breeders who have increased the average body size of their birds have been rewarded with increased size in the eggs from their flocks. This fact has been noticed during the incubation season.

Another factor affecting egg size is sexual maturity. The earlier in life a pullet starts to lay, the greater the likelihood of a decrease in egg size. Unduly-early sexual maturity results in reduced body size and egg size. A very high rate of production also often results in a decrease in egg size.

Age at the first egg, rate of production, and body size all apparently influence egg size. Nevertheless, it is possible to develop strains of laying birds giving a high proportion of large eggs—2oz. and heavier—or a flock can be bred to give a large number of small eggs. It is considered that both the sire and the dam influence inherited egg size.

The average breeder can safeguard against an undue proportion of small eggs by studying body weight in his breeding stock and by not using any breeding female which lays eggs lighter than 2oz.

Interior Quality

The interior quality of eggs, particularly as it affects the keeping quality, is of the utmost importance economically. Studies of egg quality as influenced by breeding have indicated that the percentage of thick white to total white is an inherited characteristic. On the other hand, the period of the year when the eggs are laid and the effect of temperature result in marked variations in the quality of egg white.

Shell Thickness

Some evidence collected indicates that shell thickness is an inherited characteristic. It is doubtful whether this fact can be turned to practical advantage with the information at present available.

◆

Production of Small Fruits Increasing in Hawke's Bay

HAWKE'S BAY has long been recognised as one of New Zealand's leading districts for the production of pip and stone fruit, but little is known of small fruit growing there. This branch of the industry has only recently come into prominence in the district after a lapse of several years during which production did not pay. In the past three years the area in small fruits has increased considerably, and Hawke's Bay now has the largest acreage of them of any district in the North Island. In this article R. I. June, Orchard Instructor, Department of Agriculture, Hastings, reviews the small fruit production of the province and describes methods adopted by growers.

The overhead sprinkler system of irrigation used on an 8-acre block of raspberries in Hawke's Bay. Recent exceptionally-dry seasons have emphasised the need for an adequate irrigation system for small fruits.

THE total area in Hawke's Bay devoted to the production of berry fruits is about 183 acres, made up as follows:—

	acres
Raspberries	116
Strawberries	15
Gooseberries	15
Black currants	16
Boysenberries	16
Loganberries	2
Others	3
Total	183

Need for Irrigation

The soil and climatic conditions of Hawke's Bay are fairly well suited to small fruit production provided some care is taken in the choice of a site, but recent exceptionally-dry seasons have emphasised the need for an adequate irrigation system on which to rely during dry periods. The installation of such equipment is not general as yet, but several growers have proved its value. Some growers irrigate by running the water between the rows, but other growers have employed the sprinkler system on raspberries with good results. Whatever system is employed, care must be taken not to alter the soil texture by overwatering or disturbing the soil too soon after application. Artesian water can be obtained at varying depths almost anywhere on the Heretaunga Plains with a flow sufficient for an ample supply. Some growers' properties are close to streams from which water can be pumped and, as the temperature of this water is much higher than that of the artesian supply, it is preferable. Such installations are also cheaper.

On a good site, where plenty of organic material is incorporated in the soil to hold moisture, the need for irrigation is not so great, though it would still be a useful insurance against prolonged dry periods.

Markets

In recent years the local demand for small fruits has been keen, but this year production reached a stage at which outside markets had to be sought. Small fruit growers, particularly those with raspberries, were fully aware of this, and they formed a Small Fruit Growers' Association to serve as a marketing organisation. Large quantities of fruit were disposed of by this association during the past season, opening up avenues for next year's crop, which will be far in excess of any produced so far, even if no more planting is done, as many areas will be producing their first main crop.

Local canneries offer a potential outlet for further supplies. Two such firms have planted areas of their own to ensure at least part of their requirements, as sufficient supplies have not been obtainable in the past. That position would not have arisen had supplies been available from private growers. However, these firms still require more small fruits.

A quick-freeze unit now operating in the district also requires a considerable quantity of small fruit, particularly strawberries and raspberries, giving growers yet another outlet for their produce without having to contend with the problem of transport to outside markets.

Diseases and Pests

The district is fairly free from diseases and pests but, with plantation areas increasing, care will be needed to ensure that this position does not deteriorate in the future.

Spraying programmes vary considerably, many growers doing little or none. It is considered that a thorough spraying programme should be carried out, as preventing pests and diseases from obtaining a hold is much easier than eradicating them after they have become established.

A spray schedule for all small fruit is contained in Department of Agriculture Bulletin No. 161, "Control of Orchard Diseases and Pests by Spraying."

Raspberries

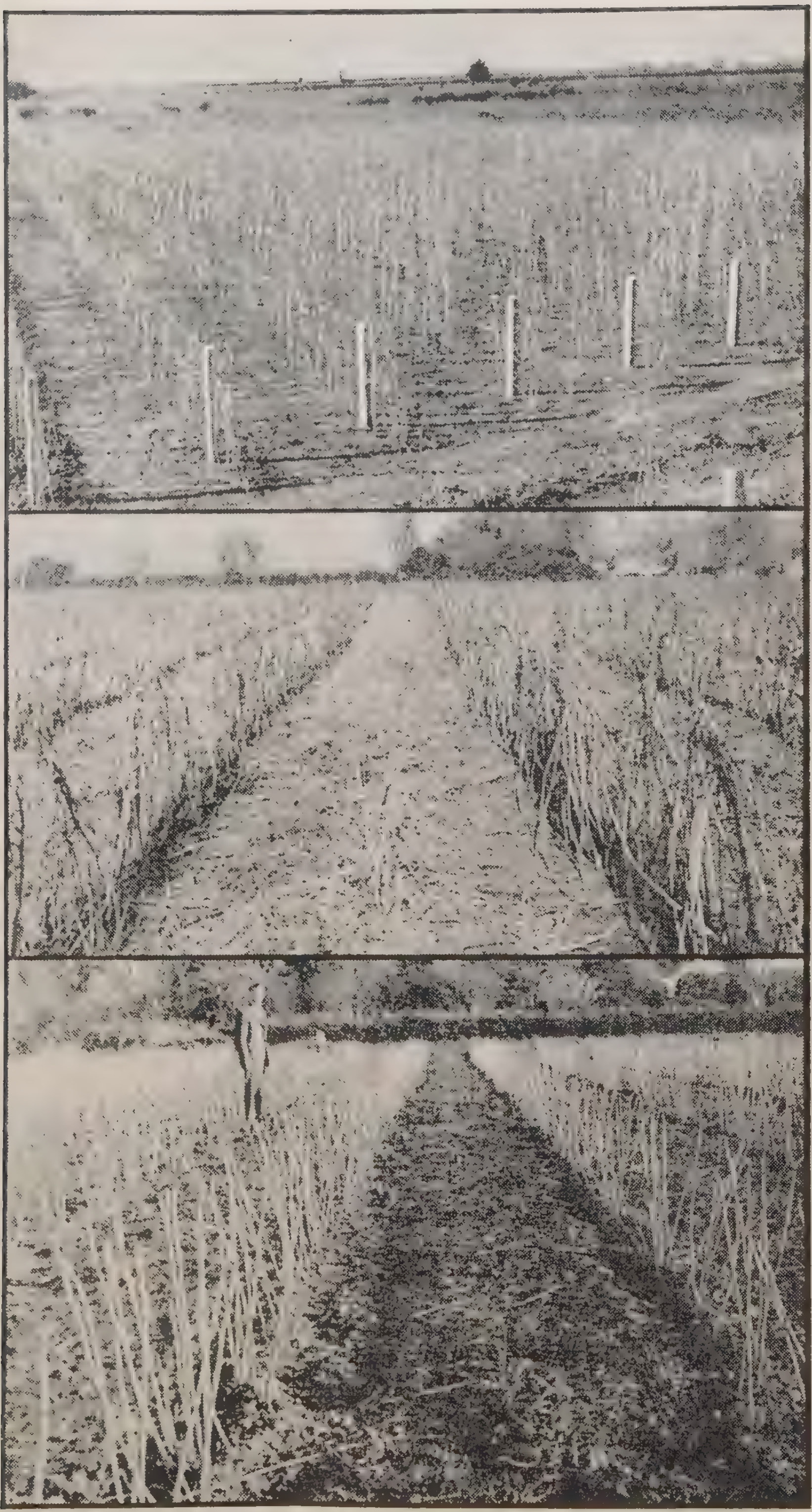
The raspberry is the berry fruit favoured by Hawke's Bay growers, and the area under them has increased from 5 or 6 acres in 1943 to 96 acres in 1947 and 116 acres in 1948. That is the largest area grown in any district of the North Island, and more plantings being carried out will increase it still further.

Yields

As there are few old-established areas, it is too early to estimate average production, but crops of more than 3 tons an acre have been produced by several growers, and crops of considerably more than 2 tons are usual.

One grower with an area of ½ acre, planted in 1944, with rows 5ft. apart and plants 2ft. apart, obtained 4500lb. of fruit in the 1946-47 season, giving a crop of 4 tons an acre. An accurate record was kept, and this area appears to be an average one, without irrigation. As a result of two dry summers, the area produced little more than

TRAINING OF RASPBERRY CANES



[News-photo Service photos.

Three methods of training raspberry canes used in Hawke's Bay. Upper—Tied to 2 wires. Middle—Tied at the tips in bunches of about a dozen. Lower—Pruned to 2ft. 6in. or 3ft. so that they stand erect without support.

3000lb. in 1947-48, but was just over 4600lb. this season.

Varieties

Lloyd George is the principal variety grown. It appears to be well suited to the conditions and gives very satisfactory results.

Three acres of Red Antwerp came into production for the first time last season and produced a little less than 1½ tons an acre, but increased considerably this year.

Improved Lloyd George is being tried on a small scale, and one grower is planting a small area of Great American this season. The performance of these will be watched with interest.

Systems of Planting

The hedge system of planting is that most widely used. The plants are set out from 18in. to 2ft. apart in rows 6ft. apart, or spaced to suit cultivating equipment. Wires are then run in pairs attached to cross-pieces fastened to posts set at convenient intervals. The wires are prevented from spreading by the use of S hooks clipped on every few feet. These hooks help to hold the fruiting canes upright without being tied and can be unhooked at pruning time, allowing the wires to hang slack and out of the way. Two sets of wires are required where canes are well grown, one 18in. and the other about 3ft. from the ground.

Another method used is the stretching of two or sometimes three wires tightly between posts, the canes being tied to the wires with binder twine. This hampers pruning but has the advantage of holding the canes firm and upright, preventing wind damage, and facilitating picking.

As wire has become costly and difficult to procure of recent years, many growers merely cut the fruiting canes to 2ft. 6in. or 3ft. from the ground so that they stand erect without support, but that reduces the area of fruiting wood and would appear to reduce the yield.

Yet another system used is the tying of the tips of the canes together in bunches of a dozen or so. That tends to smother many of the top buds and also makes spray penetration difficult.

Two growers have planted areas on the hill system. The hills are 6ft. apart each way, and canes in each are tied together loosely for support. However, it is too early to compare yields of this and other systems.

A common error made by many growers employing the hedge system is allowing too wide a row of new wood to come to maturity. These excess canes only have to be cut out by hand at pruning time, and meanwhile they take up valuable plant food and moisture, prevent fruit development on the lower wood of the inside canes, and are a source of annoyance at picking time.

All this could be avoided by keeping these suckers down as they come through the ground, which would prove far cheaper in the long run. The plantation would also have a longer life, as less plant food and moisture would be wasted in growing useless wood. Frequent shallow cultivation is necessary, as the Lloyd

[Hope Cross and Richardson photo.

Spraying a young raspberry garden. Spraying programmes for small fruits vary considerably in Hawke's Bay.

George variety produces large numbers of suckers, and considerable hand hoeing is also needed.

Manuring

To keep up the vigour of any plant growing in the same position year after year requires a good deal of feeding, even if it was originally established in a rich soil. Mulches such as farmyard manure or compost are recommended in preference to manures lacking in humus. The mulches are valuable not only as plant food when properly broken down for assimilation but for retaining moisture and keeping the rooting area cool. That is very important, as the feeding roots of the raspberry tend to be near the surface.

Because of the nature of raspberry growth, raising cover crops between the rows is difficult. To overcome this the necessary crop can be grown elsewhere, composted, and then spread along the rows. Even if not composted before application, it would be preferable to no application of humus at all. Straw is used for this purpose extensively in other countries.

Some Hawke's Bay growers apply from 3 to 5cwt. an acre of blood and bone, dried blood, or bone fertiliser. Where vigour is lacking a dressing of superphosphate may be beneficial. Experiments overseas indicate that potash is essential for a good yield, but it must be properly balanced with nitrogen. Department of Agriculture Bulletin No. 258, "Raspberry Culture in New Zealand," gives recommended applications.

Diseases and Pests

There is evidence of cane spot (*Elsinoe veneta*) in the Hawke's Bay district. In isolated areas, plants with yellowed leaves and poor growth have been found to be affected with root rot fungus (*Armillaria mellea*). Apart from these, the district is very free from disease.

Several insect pests do considerable damage from time to time, and growers should make certain their spray programmes are sufficient to keep them under control. Raspberry bud moth (*Carposina adreptella*) is more widespread than it was a year ago. Leaf roller caterpillar (*Tortrix postvittana*) was much in evidence this year, some growers' areas having heavy infestations. Bronze beetle (*Eucolaspis brunneus*) appears to be troublesome only in isolated patches, but can cause serious foliage damage.

Leaf hopper (*Typhlocyba australis*) is found in most areas. This sucking insect probably does more damage than growers realise, as it is found from October right through the season until leaf drop. Effective control can be obtained with a spray of ½lb. of active D.D.T. (2lb. of 25 per cent.) to 100 gallons. As with all sprays, complete coverage is necessary, requiring good pressure and volume to penetrate the dense growth of canes in full leaf.

Grass-grub (*Odontria zelandica*) and other species have proved a problem with one or two growers. D.D.T. gives effective control of grass-grub when it is on the wing. Other methods of control are given in Department of Agriculture Bulletin No. 244, "The Grass-grub Problem." A spray schedule for raspberries is set out in Bulletin No. 258.

Spraying Methods

Methods of applying sprays require attention. A knapsack sprayer does not give the required volume or pressure for satisfactory results, and it is too slow. A mobile power sprayer is more suitable.

A small portable orchard sprayer can be adapted by affixing to the rear of the outfit an upright beam with three nozzles on each side. The beam is fixed and gives complete coverage from ground level to tips. One side of each of two rows is covered at a time, and only one man is required—to drive the tractor pulling the outfit. The drawback is that, unless the rows are fairly wide apart, it is difficult to pass through without damaging young growth considerably.

Another method employing an orchard outfit is sometimes used in Hawke's Bay. The machine is set in operation at the ends of the rows and a long hose is used. The operator walks up one side of the row as far as the hose will reach and returns down the other side. The area must be laid out so that the full length of the rows can be covered by working from both ends.

Spraying attachments can now be obtained for small power cultivators. They have proved very satisfactory for areas that are not too large.

Strawberries

The production of strawberries in Hawke's Bay has not increased to any marked extent. More than 20 growers have included them with other crops, but the area for the whole district is only about 15 acres. Higher production costs and extra labour requirements no doubt have been governing factors, as the demand for this popular fruit has never been satisfied.

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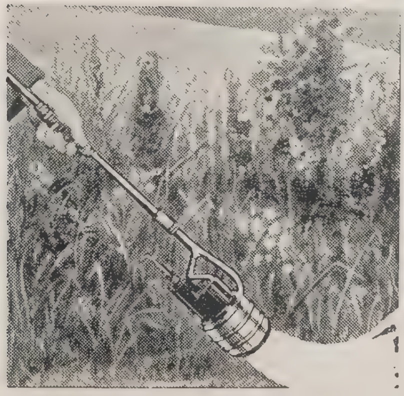

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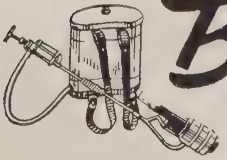

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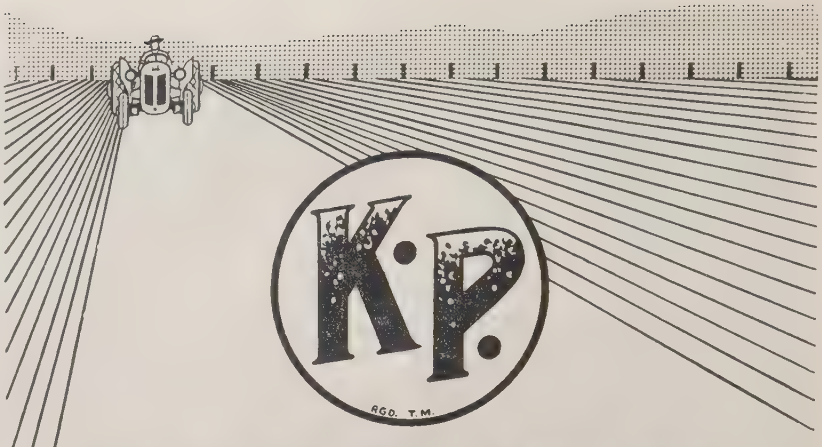

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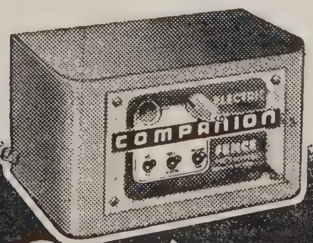

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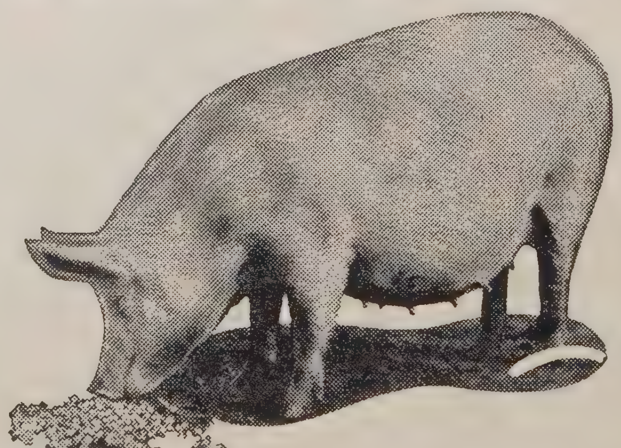

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Portion of a well-mulched bed of strawberries.

Varieties

Among the main varieties grown is Madam Melba, which has proved suitable to the district and has a firm berry with good carrying qualities. Improved Melba is coming into favour but is not grown very extensively as yet. Wright's Prolific is a strong grower and a heavy cropper but does not carry or keep well. Captain Cook is the finest quality berry grown in Hawke's Bay and carries exceedingly well. A few Chapman's Seedling are grown, but it appears to be going out of favour. Four new varieties of virus-free stock from England are now on trial in the district.

Culture

Strawberries are usually planted in single rows from 2 to 3ft. apart, according to the cultivating equipment to be used. Some growers prefer double rows 1ft. apart with spaces of about 2ft. 6in. between. Others plant out in beds up to 3ft. wide with picking lanes of about 2ft. 6in. between beds. Plants are spaced from 12 to 15in. apart in the rows in all cases. The single row is preferable, as it facilitates elimination of runners, picking, and cultivation. It also helps in control of pests and diseases.

As strawberries are usually grown in conjunction with other fruit or vegetable crops, few areas receive the attention they should. Failure to remove runners, especially in the first year, is a common fault. This lack of attention is not conducive to the development of large crowns for the second year, which is the main producing period of the plant's life. It has been found impossible to force the first-year crop as is done in the Auckland district, and third-year crops have also proved unsatisfactory. Therefore it is necessary to have a new lot of plants coming on each year to replace the old ones. A proper system of rotation should be considered if a grower intends to grow this crop each year.

Few production figures are available, but a crop of a little more than 4 tons to the acre was accurately recorded by one grower last year. Irrigation is necessary for satisfactory production in most localities.

Pests and Diseases

Birds are always a source of annoyance to the strawberry grower. Various types of scares are employed, but the gun is the most satisfactory. Grass-grub has also caused serious loss in some localities. Leaf hopper appears every season throughout the district.

There is evidence of virus disease in many plants, and obtaining plants completely free from it seems almost impossible. It appears to be a contributing factor in the disappointing yields that many growers experienced last season. The considerable infestation of aphides found throughout the

[*Hope Cross and Richardson photo.*

Gooseberries need adequate shelter, such as that provided by the poplars in this illustration.

[*News-photo Service photo.*

One method of training loganberries in Hawke's Bay. Boysenberries, cultural methods for which are very similar, appear to be displacing loganberries in the district.

district would quickly spread the disease even if it were possible to obtain virus-free plants. Early applications of 25 per cent. D.D.T. at the rate of 2lb. to 100 gallons a month before fruit matures, followed by nicotine sulphate 1 : 800 two weeks later, should give satisfactory control of this pest.

Gooseberries and Black Currants

Fifteen acres of gooseberries and 16 acres of black currants are grown in Hawke's Bay. Gooseberries are producing well, and indications are that they will be planted to a greater extent than black currants for the coming season.

The main gooseberry varieties are Farmer's Glory, Roaring Lion, and Gregory's Perfection. Baldwin's Black, Carter's Black Champion, Lee's Prolific, and Boskoop Giant are the favoured black currants.

Little trouble is experienced with diseases or pests on these bush fruits. Scale insects of various kinds are found but are easily controlled. Department of Agriculture Bulletins 297 ("Gooseberry Culture") and 282 ("Currant Culture") contain recommendations for the control of diseases and pests, as well as general cultural information.

Planting is usually on the square system, with from 7 to 9ft. between plants. Some growers prefer to reduce the distance in the row to 5 or 6ft., which gives more plants to the acre but allows easy cultivation only one way.

No reliable production figures are available for these fruits at present.

Boysenberries and Loganberries

The boysenberry is becoming more popular and seems to be displacing the loganberry to some extent in Hawke's Bay. Little more than 16 acres is in production at present, but no doubt this will be increased. Less than 2 acres of loganberries is grown.

The loganberry is still desired by some for its acid flavour. A proportion of loganberries added to raspberries in jam greatly improves the flavour, surpassing the product of either of these fruits made separately.

Culture

Cultural methods for these two fruits are very similar. Under Hawke's Bay conditions the rods grow to a considerable length—often more than 20ft. Stout fences with two or three heavy wires are required to support these rods.

After fruiting the old rods are removed and the current season's growth lifted and wound round the wires. Care must be taken during this operation to prevent undue damage to buds, so the new rods should be trained in place soon after the picking season, at which stage the buds are small and protected by the leaves. Not too many rods should be trained on the wires in a bunch, as that tends to smother the inside buds and makes disease control difficult.

Diseases and Pests

One outbreak of cane spot occurred in boysenberries last season. That indicates the need for keeping up the Bordeaux sprays as for raspberries. The bud moth and white rose scale are also pests of these fruits, but there is no reason why they should become severe if spraying is thorough.

Other Small Fruits

Passion fruit and Chinese gooseberries are grown to a small extent in Hawke's Bay and only in the more sheltered positions. Apart from two commercial areas of passion fruit and one of Chinese gooseberries, these fruits are confined chiefly to private gardens. Though only a very small percentage of these home-grown fruits is sent to the markets, production must be considerable and tends to supply much of the local domestic requirements.

Settlement of Ex-servicemen

Small fruit growing has played no small part in the rehabilitation of returned servicemen. It has given them the outdoor occupation which many of them desire, with pleasant work and fairly-quick returns.

A holding of 5 or 6 acres is sufficient, but a larger area can be managed by introducing other crops. That is the method usually adopted in Hawke's Bay. Crops such as asparagus, tomatoes, or roots may be chosen. Asparagus is selected by many growers because it is an early crop and helps to spread the harvesting season, as well as giving an income over a greater part of the year. Asparagus harvesting is followed by the harvesting of gooseberries, black currants, raspberries, and boysenberries or loganberries.

A suggested layout for a 10-acre block would be: Asparagus 3 acres, gooseberries 1 acre, black currants ½ acre, raspberries 2 acres, and boysenberries or loganberries ½ acre. The remaining 3 acres could be used for such crops as tomatoes, pumpkins, or roots. Strawberries could be grown in place of black currants if desired and if soil and site were suitable.

Small fruits are also grown in conjunction with pip and stone fruit production to a small extent. Fruit varieties should be chosen carefully in this case, so that harvesting seasons do not clash unduly.

Suitable land has been difficult to acquire up to the present, but more is now becoming available. That will probably mean an increased area of small fruits and at the same time will provide settlement for many returned servicemen.

The Pruning of Trees in the Flower Garden

THOUGH trees may be pruned at any time during summer and autumn, it is usually more convenient, especially when deciduous trees are leafless, to attend to this work during winter before the rush of spring sap flow begins. Excessive bleeding of sap from wounds inflicted by pruning may seriously affect the general health of the tree. In this month's article for the flower gardener M. J. Barnett, Director of Reserves to the Christchurch City Council, explains the aims of pruning and the correct method of carrying out the work.

TREES in their natural environment grow in groups, in forests, or in association with other trees and bushes. Under such circumstances the trees in their endeavour to obtain the maximum of light are forced to grow upward, thus of necessity forming straight, clean trunks. Naturally there is competition for space—a continual war, as it were, between the individual members of the association for supremacy; the weaker are suppressed and only the stronger survive. Furthermore, the development of the branches is reduced in both size and number by competition on all sides. However, despite the continual competition, the trees do offer mutual support to each other.

When planted as individual specimens in a garden trees are given ample space in which to grow, there is no undue competition, and as a result they develop branches on every side almost from ground level to the uppermost parts. Specimens tend to produce forked trunks, too many branches, and too great a canopy of foliage, characteristics which make them more liable to storm damage. Unfortunately some people maintain that a tree should be allowed to grow "as Nature intended it" and therefore it should not be interfered with. It might as well be argued that Nature did not intend trees to be grown as individual specimens on lawns, in gardens, and in places away from their natural environment.

Where trees are grown essentially for their beauty the aim of the gardener is to produce specimens with a straight, well-defined leader or main trunk, a well-proportioned and balanced distribution of branches, and a good, healthy canopy of foliage. Certainly the tree may be encouraged to develop its true form, poise, and character, but, symmetry being the main objective, it will require to be trained in the way it should grow. Superfluous branches that cause overcrowding should be thinned out. Those that are out of proportion to the rest of the growths and those that tend to compete with the main leader should be restricted or removed, as should dangerous outgrowing branches which, by their placement and by the weight of the numerous lateral branches from them, are likely to split or tear away from the main trunk under the stress of high winds and heavy rains. All suppressed, dead, or damaged branches should also be removed.

However, the method of removing these branches is often at fault. A branch to be removed from the trunk or from one of the main leaders should be cut off as close as possible to the stem from which it has its origin. Too frequently stumps of 2in. or longer are left. These "snags" not only are unsightly but in time may be the direct cause of decay starting in the trunk, thus imperilling the life of the tree. The stump dies, the wood fibres start to rot, and the decay eats its way into the main trunk; in time the rotten stump may drop off and the cavity be closed by the healing cambium layer, but the decay beneath started by the stump continues to eat into the heart of the trunk. The process is equivalent to the skin healing over a wound while the flesh below is still septic.

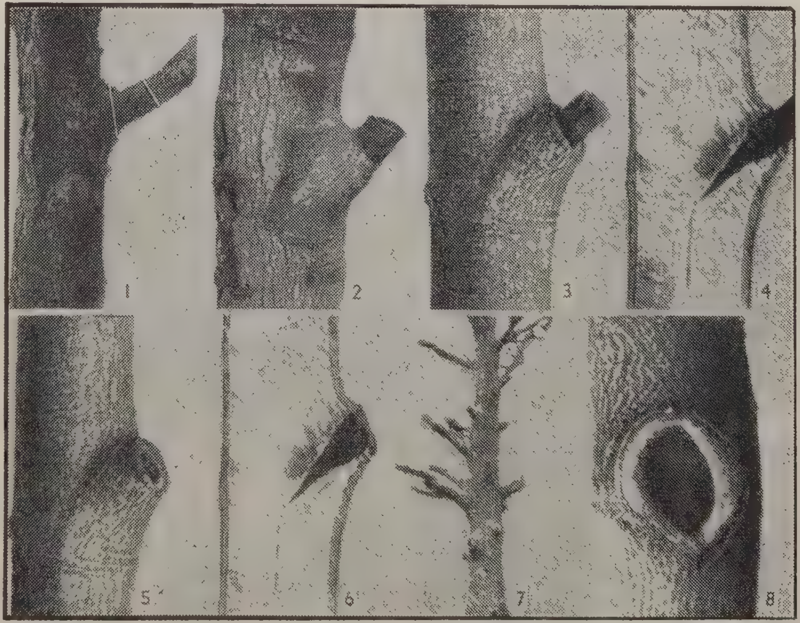
Where a branch has its union with the main stem there is a greater thickness of wood on the under side. This fact tends to make the best-intentioned of pruners cut outward away from the main axial line of the trunk instead of parallel to it. Thus a short stub is left. In time it will heal over, but a protruberance is left disfiguring the symmetrical lines of the trunk. True, correct removal of the offending branch leaves a bigger scar, but the cambium or healing layer of bark will cover the wound more readily and more quickly.

Large or heavy branches should be removed in 2 or even 3 pieces. Attempting to remove them in one operation by cutting through close to the trunk often results in large and unsightly wounds. When the cut has been made about halfway through, the weight of the branch causes it to split more or less vertically and tear away from the trunk, stripping away the bark and leaving a nasty scar.

The correct procedure is as follows: Begin the first cut on the under side of the limb about 12in. from the shoulder; if possible, cut in to about halfway. Then remove the saw and make a second cut on the upper side of the limb a few inches beyond the under cut. The weight will cause the branch to split longitudinally where the 2 cuts meet. The stub which is left may then be removed without fear of its weight tearing away the bark.

All wounds provide an ingress for disease, so it is necessary to apply a

THE EVOLUTION OF A KNOT-HOLE



1—The limb is removed along the outer instead of the inner line. 2—A stub is left. 3—The bark falls away and tissue is deposited at the base. 4—A section of the stub showing the decay. 5—The stub falls out, leaving a knot-hole. 6—A section showing how the decay is carried far into the tree. 7—An example of very bad pruning. 8—The healing of a properly-made pruning scar.

Illustrations from "Shade Trees in Towns and Cities," by William Solotaroff; published by John Wiley, New York.

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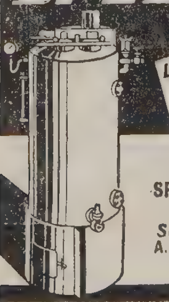

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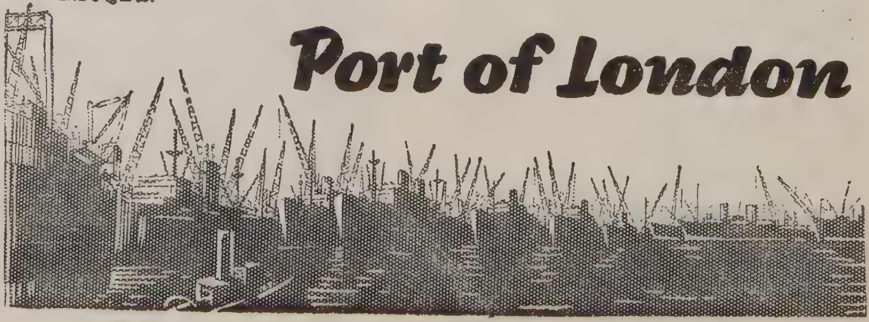

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dressing which will effectively surface the scar and prevent decay until it has callused over. When the cut has been completed the roughened surface of the bark layer should be carefully pared off with a sharp knife and the wound covered with a coating of liquid coal tar. Coal tar such as that sold for coating roofs is a safe and efficient dressing.

Work in the Glasshouse

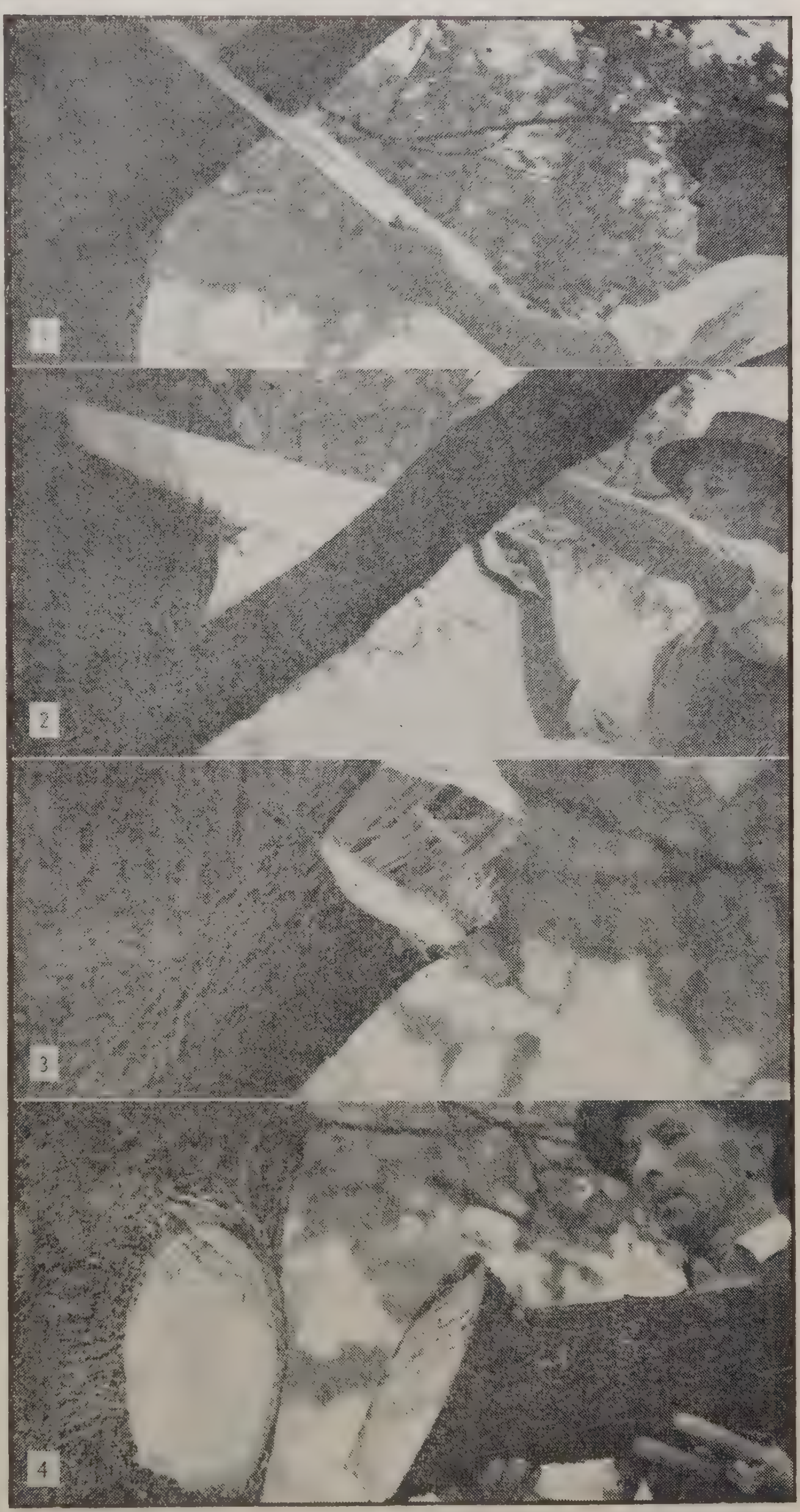
July is probably the coldest month of the year in New Zealand and the most trying one for plants under glass. Constant attention to watering, heating, and ventilation is necessary to keep them healthy and vigorous. An endeavour should be made to maintain uniform day and night temperatures; rapid fluctuations of temperature are to be avoided. During bright sunshine the ventilators should be opened sufficiently to prevent a sudden rise in temperature and to allow the damp atmosphere to escape, but the plants must not be subjected to cold draughts of air. Closing the ventilators about mid-afternoon traps much of the sun's heat within the glasshouse, materially assisting in maintaining a higher night temperature. During wet or dull, heavy weather when humidity is high, water should be used as sparingly as possible and paths and benches should not be allowed to become too moist, for once the atmosphere within the house becomes super-saturated with moisture condensation will collect rapidly not only on the interior of the glass and framework but also on the plants, frequently providing the initial cause of disease such as botrytis or "damping off," which in tender seedling plants may rapidly prove fatal.

On the other hand, where heating appliances are in use to maintain the required temperature, it may happen, especially during very cold weather when more heat is necessary, that the artificial heat radiated from the hot water pipes will lower the humidity inside the house to such an extent as to bring about dry conditions which are detrimental to the wellbeing of the plants. Under such circumstances the benches and flooring should be lightly "damped down"—that is, sprayed with a film of moisture—during mid-morning and mid-afternoon. In favourable weather the foliage also may receive a slight damping, but that does not apply to plants in flower. The main objective is to preserve an even balance between temperature and humidity.

The watering of the plants must also be carried out with discretion. During wet and cold weather the plants will not absorb the same quantities of moisture as they would under normal conditions, when transpiration is more rapid. Endeavour to prevent the soil in pots or containers from becoming waterlogged and sour. Examine the bases of the pots to see that the drainage vents have not become blocked. Remove all spent flowers and dead or decaying foliage.

Above all, practise glasshouse hygiene. A handy little book on "Seed and Potting Composts," by W. J. C. Lawrence and J. Newell, deals with the subject of glasshouse hygiene and

THE CORRECT METHOD OF PRUNING



[*Green and Hahn Ltd. photos.*

1—Making the lower cut. 2—Making the upper cut. 3—The branch removed without any tearing of the bark. 4—The stump removed parallel with the line of the trunk.

SHRUBS with COLOURED FRUITS

Plants which bear scarlet or red berries during autumn and winter are not difficult to obtain, but to have one which produces blue berries is not so easy. *Clerodendron fargesi* (above), a native of China, is a vigorous deciduous shrub with comparatively-large leaves. Though the flowers have no particular merit they produce numerous porcelain-blue fruits about the size of small peas. Added attractiveness to the fruits is given by the persistent calyx or surrounding sepals, which turn pink as the fruits ripen. The shrub is perfectly hardy, will grow in any average garden soil, and, if given reasonable shelter, will prove attractive when in full fruit.

Pernettya mucronata (right), a dwarf, hardy, evergreen shrub from the Straits of Magellan, belongs to the same natural order of plants as the ericas and rhododendrons. It thrives best in a cool soil similar to that recommended for rhododendrons. The flowers in many instances are unisexual, and to make sure that the bushes will fruit freely they should be planted in groups with 1 or 2 male plants among them. The attractive fruits, which remain throughout the winter, are large and fleshy, varying from near-white to pink and purple.

[Green and Hahn Ltd. photos.

should be in the possession of every gardener who has a glasshouse.

In cold frames where half-hardy bedding plants such as geraniums are being wintered the lights should be removed for a few hours during fine and favourable weather, but under unfavourable circumstances the lights should remain on but be raised an inch or two to allow the damp and foul air to be expelled. Before nightfall all lights should be closed and covered with heavy scrim or hessian to protect the plants from hard frosts which may penetrate below the glass. The covering should be removed in the morning unless a severe frost has occurred, in which case it can be left on until the sun has warmed the atmosphere, for many half-hardy plants that have been touched with frost will recover if kept shaded from the bright rays of the sun until they have had time in which to thaw out gradually.

At this time of the year geraniums tend to develop leaf rust. As a means of control all dying or decayed leaves should be removed and the plants sprayed with a weak solution (summer formula) of lime sulphur. Flowers of sulphur lightly dusted over the foliage may be used as a substitute.

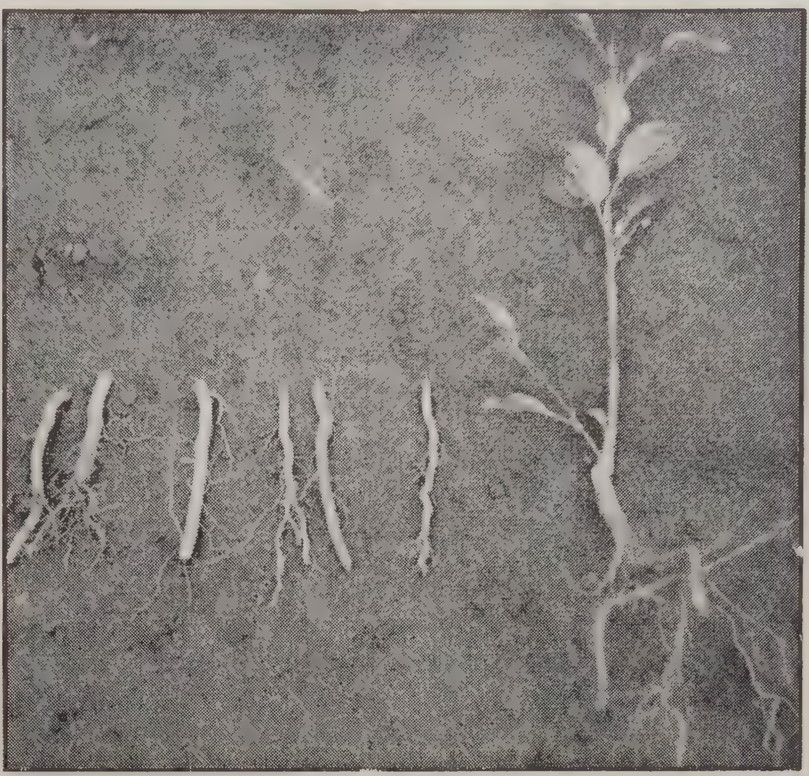
In the greenhouse such subjects as the cyclamen, cinerarias, *Primula sinensis, P. stellata, P. kewensis, P. malacoides*, and *P. obconica* should be in full flower and rapidly approaching their maximum display. To maintain a continuity of bloom for a few weeks longer flower heads should be removed as soon as they are past their prime to prevent their setting seed. The fundamental object of every plant is to perpetuate its kind, and if it is prevented from fulfilling this function, in its endeavour to do so it will continue to flower for much longer than it would normally.

Fumigation to Control Greenfly

To maintain a sequence of flowers in the greenhouse the plants to be relied on are the calceolarias, the schizanthus, the regal pelargoniums, and the early pot-grown hydrangeas. All but the schizanthus are very subject to attacks of greenfly, which must never be allowed to appear. Greenfly increases at an alarming rate and can be controlled only by prompt and adequate measures.

As a means of controlling greenfly under glass fumigation is more effective than spraying. Several reliable proprietary fumigants are available, but no matter what kind is used the instructions supplied by the makers with every container must be carefully read and fully understood beforehand and religiously adhered to in its use. Too much caution cannot be observed in the use of any kind of fumigant. The dosage is recommended at the rate of so much per 1000 cub. ft. of space; the cubic content of a house may be estimated by multiplying the length by the breadth by the average height.

Though one application may be sufficient to exterminate the active insects, it will not kill the eggs, which will hatch out within a few days. Therefore to clear the house of the pest thoroughly it is necessary to give a second and sometimes a third application within a week or 10 days of each other.



[*Green and Hahn Ltd. photo.*

Root cuttings of trees, shrubs, and herbaceous plants which can be propagated in this way may be taken at this time of year, and the method is described below. These root cuttings of *Pyrus baccata* have been prepared for planting in the cutting bed. On the right is a tree 12 months old grown from a root cutting of the same tree.

Propagation of Root Cuttings

Some trees, several shrubs, and a number of herbaceous plants are readily and successfully propagated by root cuttings, which may be taken this month. Typical examples are the graceful evergreen tree *Maytenus chilensis* and its close affinity *Maytenus boaria;* most species of crab apples (*Pyrus*) that exist on their own roots and have not been grafted or budded on to a stock plant; the shrubby pink-flowered *Robinia hispida;* the tree poppy (*Romneya coulteria*); the stag's-horn sumach (*Rhus typhina*); named varieties of the oriental poppy (*Papaver orientale*); and any of the perennial anchusas.

Only the roots of good, healthy plants should be used. In the case of most trees and shrubs the vigorous outward-growing pieces away from the main tap roots should be used; pieces a little thicker than a lead pencil and with a few fibrous rootlets attached are preferable. These are cut into lengths of from 4 to 6in. and placed firmly into prepared trenches in the cutting bed as recommended last month for hard-wood cuttings. Care should be taken to keep the upper part or crown of the cutting almost level with the surface of the soil. To induce ready rooting the soil should be friable and contain a goodly proportion of sand, and to protect the crowns of the cuttings a thin layer of sand can be sprinkled over them. With the herbaceous plants the thicker, fleshy roots should be used. The crowns or upper parts of such cuttings are often cut square across and the basal cuts made with a slant so that there is no fear of the cuttings being planted upside down.

Propagation under Glass

For early flowering, seeds of such annuals as 10-week stocks, nemesia, and sweet peas may be sown under glass now.

Sweet peas are somewhat impatient of root disturbance when being transplanted, and for that reason the young plants are often grown separately in containers such as 3in. pots. A simple and effective method of raising them is to obtain a piece of good, fresh turf the size of an ordinary seed tray and about 2in. thick. As much of the grass as possible is shaved off and the turf cut into pieces about 2in. square. With a tubular piece of piping—an old hollow pot handle makes an excellent implement—a plug about ½in. in diameter and 1in. deep is removed from the centre of each square of turf, and the hole thus provided is given a little filling of sandy compost. The squares are then placed grassy side down in the seed tray, which has been provided with the usual drainage such as riddlings from compost or short strawy manure, and 1 seed is dropped into each hole and covered with more of the compost. After germination the roots will quickly penetrate the squares of turf, and when the plants are sufficiently forward for planting out into their flowering quarters the squares with the roots intact may be removed easily without the plants suffering undue injury.

Where a heated greenhouse or propagating frame is available seeds of such bedding plants as antirrhinums, fibrous-rooting begonias, lobelia, *Salvia farinacea*, and the Chabaud and Marguerite carnations, which require some time to make growth before reaching the flowering stage, should be sown.

Pot-grown chrysanthemums that have finished flowering should be cut over, removed to a frame or sheltered part of the garden, and encouraged to produce cuttings for next season's supply of flowering plants.

Care of the Ground

During favourable weather when the surface of the soil is not wet and sticky opportunity may be taken to aerate the soil in flower beds and borders with the hoe and garden fork. Surface cultivation of the soil improves the general appearance, assists in keeping down weeds, and improves what is described as the physical condition of the soil. Where bulbs are planted the hoe should not be used; in such cases, if the soil's surface requires attention, it should be pricked over with a light garden fork, care being taken not to injure the bulbs, the growths of which may be just showing above the surface.

All vacant ground required for later planting should be dug over thoroughly. New ground that is being broken up for the first time, either for the cultivation of flowers or for the growing of shrubs, should be trenched to a depth of at least 2ft. In both cases the ground should be manured while the digging work is in progress. The planting of trees and shrubs may be continued as opportunity offers.

Precaution with Wood Ash

As all the leaves of deciduous trees and shrubs will have fallen, now is the time to clean the garden thoroughly of all such debris. Leaves are valuable for composting and for leaf mould, but one piece of advice is necessary:

Leaf mould is generally recommended for rhododendrons, azaleas, ericas, liliums, and all plants which prefer an acid to an alkaline soil. These plants equally dislike wood ash in the soil, and its use in some cases has proved fatal. Ash from a rubbish fire frequently is thrown on to a leaf-mould heap, but the slightest trace of wood ash near the roots of a rhododendron or azalea will have a decided detrimental effect.

Wood ash is a valuable plant food, but only for certain classes of plants. It should be stored for future use when dry and not mixed with the compost heap.

Protection from Frost

In districts where severe frosts are to be expected some form of protection should be provided for plants which are susceptible to injury. Light scrim or even the twiggy branches of a silver birch tree placed round and over a tender plant will provide the protection needed.

For the same reason such plants as hydrangeas and geraniums which are subject to frost damage should not be pruned or cut back until all danger of hard frosts is over. The old flower heads of hydrangeas and the already partially-frosted tops of geraniums may look unsightly, but they provide a protective covering for the rest of the plant, and to cut it away now is to leave the plants open to even worse injury by frost.

Plants Recommended by the District Council of the Royal New Zealand Institute of Horticulture for Planting in the Taihape District

Evergreen Native Trees

- *Dacrydium cupressinum* (rimu)
- *Nothofagus fusca* (beech)
- *Pittosporum eugenioides* (lemon wood)
- *Sophora microphylla* (weeping kowhai)

Evergreen Exotic Trees

- *Ilex aquifolium* (holly)
- *Cryptomeria japonica*
- *Cedrus atlantica glauca*

Deciduous Trees and Shrubs Noted for Their Foliage

- *Acer palmatum atropurpureum*
- *Acer rubrum*
- *Liquidambar styraciflua*
- *Quercus coccinea* (scarlet oak)
- *Rhus cotinoides*

Native Shrubs

- *Hebe hulkeana*
- *Hebe speciosa*
- *Drimys colorata*
- *Leptospermum scoparium*, in variety
- *Clianthus puniceus*

Exotic Flowering Trees and Shrubs

- Rhododendron, hardy species and hybrids
- Camellia, sasanqua type, particularly desirable for their early-flowering habits
- Camellia, japonica type, newer varieties
- *Malus* (or *Pyrus*) *eleyi* (crab apple)
- *Ceanothus burkwoodii*
- *Daphne genkwa*
- Cydonia, in variety
- *Syringa* (lilac), in variety
- *Viburnum opulus sterile* (snowball tree)
- *Viburnum burkwoodii*
- *Viburnum carlesii*
- Forsythia
- *Prunus mume* The Geisha
- Rose (modern hybrid varieties)
- *Prunus serrulata fugenzo* (formerly known as *Cerasus* James H. Veitch) and other hardy members of the genus
- *Grevillea oleoides*
- *Grevillea dimorpha*
- *Euonymus europeus* (spindle berry tree)

Perennial Plants

- Aquilegia
- Carnation (border and perpetual)
- Chrysanthemum (pompons and other hardy decorative types)
- Delphinium (Pacific type)
- Doronicum
- Dahlia, in variety
- Helleborus—requires a cool shady position; included because of its mid-winter flowering habit
- *Lupinus*, newer varieties and strains
- Scabiosa
- *Iris unguicularis*, syn. *stylosa*—included for its desirable mid-winter flowering habit

[The following perennial plants are considered to be very desirable for the Taihape district, but they have comparatively-short flowering periods.]

- *Coreopsis grandiflora*
- *Coreopsis verticillata*
- Kniphofia, in variety
- Iris, bearded, newer varieties
- *Iris sibirica* and *I. orientalis* varieties, for moist, sunny situations
- Gaillardia, new varieties
- *Heuchera sanguinea* varieties
- Peony, newer varieties
- *Iris innominata* hybrids

Bulbous Plants

- Anemone species and hybrid varieties
- *Iris reticulata* and its variety *contab*—desirable for its mid-winter flowering
- Narcissus species and garden varieties
- Gladiolus, hybrid varieties
- *Lilium*, hardy varieties
- Montbretia, new varieties
- *Tulipa* species and garden varieties such as Darwin and Cottage types

Annuals (including plants not strictly annual but usually treated as such)

- *Phlox drummondii*
- Antirrhinum
- Calendula, newest varieties
- Iceland poppies (*Papaver nudicaule*)
- French marigold (*Tagetes patula*), dwarf varieties
- Sweet peas

Alpine and Rock Plants

- *Phlox subulata*
- *Dianthus watsoni*, winter flowering
- *Primula denticulata* and *P. pulvertiana*, for moist, shady positions
- *Thymus coccineus*
- Aubrietia, newer red shades
- Polyanthus, in variety
- *Alyssum saxatile*
- Campanula, in variety

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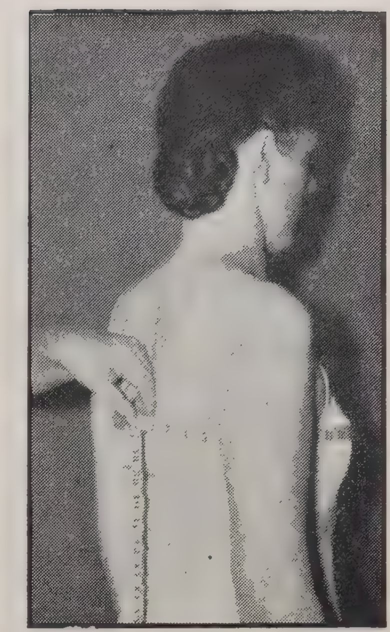
Measuring and Fitting for the Home Dressmaker

GOOD fit in clothes is essential to feelings of comfort and happiness. Poor fit leads to discomfort, an undesirable "clothes-consciousness," and inefficiency. However, many women who make their own dresses have to manage with little or no assistance with fitting, and, even with mirrors, the amount of fitting which can be done to a garment on one's own figure is limited. A set of accurate measurements helps to reduce the amount of fitting required, for the pattern used can be altered where necessary before the garment is cut out, which also is more economical of time and material than making alterations after cutting out. The technique of taking measurements and fitting garments is described in this article by Edith G. McNab, Rural Sociologist, Department of Agriculture, Dunedin.



[*Jack Welsh and Sons photo.*

Taking the bust measurement (36in. in the illustration). The tape is round the fullest part of the bust and is raised slightly over the tips of the shoulder blades at the back. The tape is held between the thumb and first 2 fingers of the left hand.

FOR general purposes measurements are best taken with outer clothing removed but over the undergarments usually worn. The posture of the person being measured is important. She should be standing upright, on both feet, with her weight balanced and her arms hanging naturally at her sides. A variation in posture may alter some of the measurements, so an easy, straight position should be maintained during measuring. The tape measure should be firmly made so that it will not stretch, and figures marked plainly on both sides are useful, though care must be taken that the tape does not become twisted during use, for then the figures on the wrong side may be read.

Measurements are taken snugly but not too tightly. The upper illustration on this page shows how to hold the tape in taking measurements round the figure. Two fingers are held inside the tape and the thumb outside; using this grip, the long end of the tape may be allowed to move freely between the thumb and fingers without losing hold of it. The left hand is usually used, leaving the right hand free to make adjustments or pin the tape in position.

When using measurements of width round the figure in testing the sizes of patterns or in drafting patterns, it must be remembered that movements of the body alter these measurements. For example, the bust measurement is increased by breathing in; the hip measurement is increased by sitting down; the upper arm measurement is increased when the arm is bent; the back measurement is increased when the arms are folded. Therefore, the measurement of the corresponding part of the pattern or fabric must be greater than the measurement taken snugly round the figure. This extra width is the "ease" which allows for movement without straining the garment on the figure or pulling the seams.

List of Measurements

Listing the measurements as they are taken avoids losing or forgetting the results of the measuring. The following list will serve as a guide, and can be written in a note-book or on a piece of paper ready to have the measurements entered alongside as they are taken:—

Bust.
Back width.
Chest width.
Shoulder width.
Waist.
Hip.
Neck.

Blouse Length—
  Front.
  Back.
  Shoulder to waist, front.
  Shoulder to waist, back.
  Underarm.

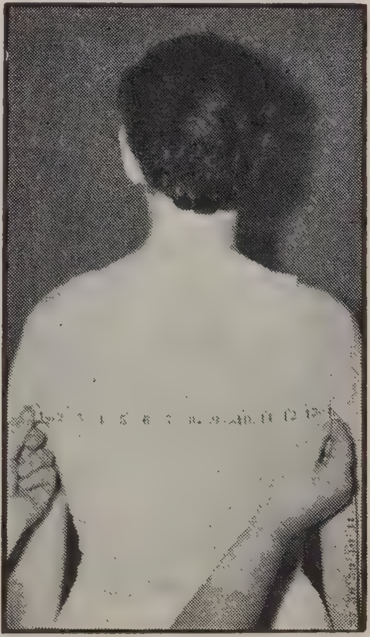
Front length, waist to floor.
Back length, waist to floor.
Underarm length, waist to floor.
Outside arm to elbow.
Outside arm to wrist.
Inside arm to elbow.
Inside arm to wrist.
Length of sleeve cap.
Upper arm.
Elbow.
Wrist.

Taking Measurements

Bust: Stand behind the person to be measured, and place the tape round the fullest part of the bust, under the arms about 1in. below the armholes, and slightly up over the tips of the shoulder blades at the back. Note the measurement, but when it is used to check the size of a pattern ease must be added. The front of the pattern will measure more than half of the total bust measurement because the front of the figure is more rounded than the back. One to 2in. may be allowed for ease in the front and another 1in. at the back, but more may be needed, depending on the design of the dress. Also, when checking the size of the pattern, take into account whether seams are allowed.

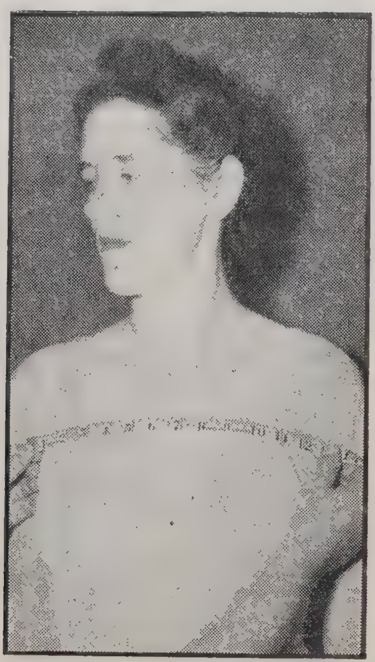
It is sometimes useful to have the front and back bust measurements taken separately. To do this, measure from underarm to underarm across the fullest part of the bust, and from underarm to underarm across the back. These 2 measurements when added should equal the bust measurement taken as described previously.

Back width is measured across the back between the junctions of the arm muscles with the body, meeting the armseye curve at the centre. This position is marked by notches on the blouse and sleeve pattern for matching during construction of the garment.



[*Jack Welsh and Sons photo.*

The tape shows the level at which the back width measurement is taken. Because of the angle at which the photograph was taken, the end of the tape appears to be a little to the left of the junction of the arm muscle with the body.



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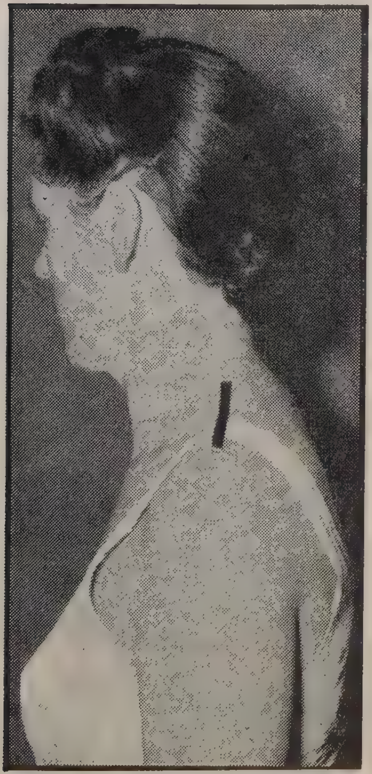
Measuring the front width. This measurement is the same as, or slightly greater than, that across the back.



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The black tape marks the position where the shoulder width is measured.

(The armseye is the armhole line round the shoulder and under the arm where the sleeve joins the dress.) As with all width measurements, ease must be added when checking the pattern size.

Chest width: Measure across the chest from the junctions of the arms with the body. The measurement will fall 2 to 3in. below the hollow at the base of the neck, and at the centre of the front armseye curve. This distance is the same as, or slightly greater than, the measurement across the back. If it is less than the back measurement, the figure is round shouldered.

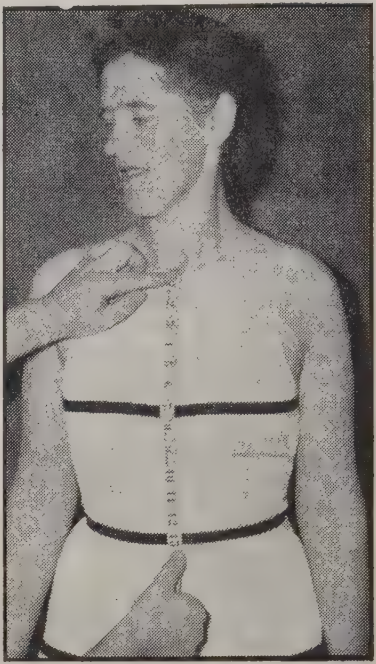
Shoulder width: The person being measured should be standing with the head erect and looking forward. Measure from the highest point of the neckline slightly behind the ear (where the muscle from the head behind the ear joins the shoulder) to a point at the end of the shoulder ½in. behind the highest point. This point falls on the armseye line. The shoulder line is straight, and 4½ to 5in. long. When the seam is stitched in the garment it should not be visible from the front when looked for with the eyes at shoulder level, but should be right on top of the shoulder. (For special designs the shoulder seam may be moved to the front or the back.) As the back shoulder is eased on to the front, the back shoulder length of the pattern should be slightly greater than the front length, because the figure is more curved at the back than the front of the shoulder. The highest point of the shoulder over which the armseye line passes can be located by feeling the bone at the top of the shoulder while moving the arm. The place where the arm bone rotates in its socket at the shoulder gives the highest point of the shoulder.

Waist: Place the tape snugly round the waist at the natural waistline and parallel to the floor. As for the bust measurement, have 2 fingers inside the tape. A spare tape left pinned round the waist is a help in taking some of the length measurements. If only one measuring tape is available, ordinary firmly-woven tape will serve to leave in position at the natural waistline.

Hip: Take this measurement 7in. down from the tape pinned round the waist. If the figure is large, it may be better to take another measurement about 10in. below the waist at the fullest part of the hips. Do not take this measurement too tightly. Add 2 to 3in. for ease when checking the size of a pattern.

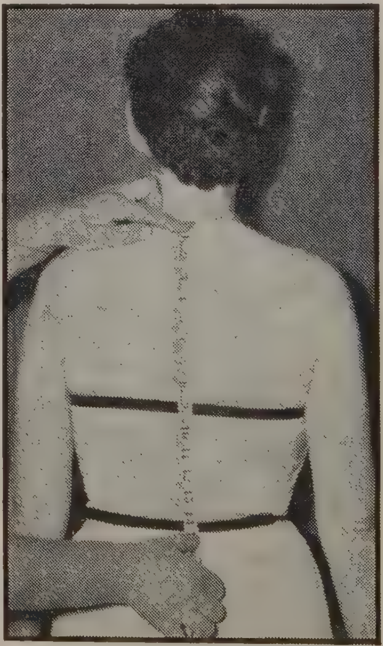
Neck: Pass the tape round the base of the neck, just above the large bone at the back, and through the centre of the hollow in front. Take the measurement very snugly. It is important not to allow the tape to slip up too high when taking the neck measurement. The neck of a pattern or garment can be enlarged simply if it is too small, but making the neckline smaller may be impossible once it is cut too large.

Blouse length: Front—From the centre of the hollow at the base of the neck to the bottom of the tape round the natural waistline. Centre back—From the large bone at the back of the neck to the tape round the waist.



[*Jack Welsh and Sons photo.*

The black tape shows where the bust, waist, and hip measurements are taken. The tape measure is measuring the centre front length for the blouse—from the pit at the base of the neck to the bottom edge of the tape round the waist.



[*Jack Welsh and Sons photo.*

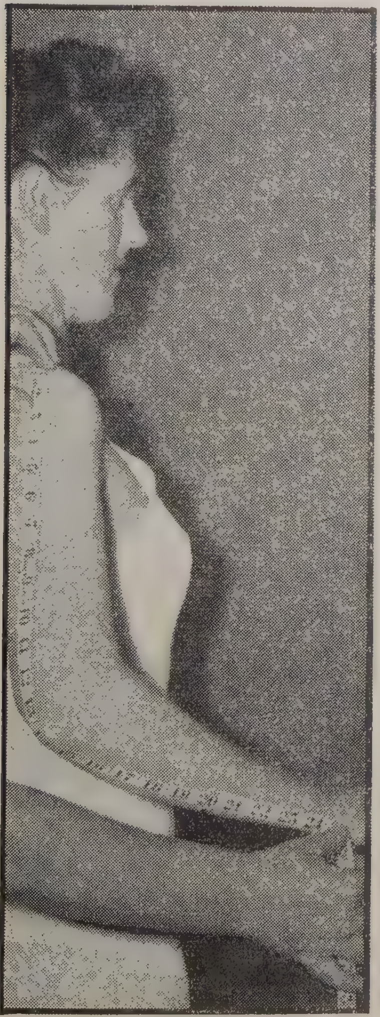
Measuring the centre back blouse length.

Shoulder to waist, front—From the midpoint of the shoulder line to the tape at the waist, taking the tape over the fullest part of the bust, then vertically to the waist. Shoulder to waist, back—From the midpoint of the shoulder line to the waist.

Underarm length: Measure from the base of the armpit to the tape at the waist. For an average figure this measurement is half the centre back blouse length. It may be helpful to put a ruler under the arm and measure from it to the waist.

Front length, waist to floor: Waist-to-floor measurements may be taken more easily with the person being measured standing on a chair or a table. Measure from the centre front of the tape at the waist to the floor, keeping the tape vertical.

Back length, waist to floor: Measure from the centre back of the tape at the waist over the lower part of the back and then vertically to the floor. This measurement is slightly longer than the front length for the average figure.



[Jack Welsh and Sons photo.

Measuring the outer arm from the point where the arm articulates with the shoulder round the elbow to the wrist at the little finger line. The measurement shown is 24in.

Underarm length, waist to floor: Measure in a vertical line from the waistline at the side of the figure over the hips to the floor. The line continued upward should pass through the armpit. This measurement is usually longer than the centre front or back measurement waist to floor, for the tape has to pass over the curve of the hip before being carried straight down to the floor.

Outside arm to elbow and wrist: The person being measured should hold the arm bent at right angles at the elbow. Place the end of the tape on the bone at the shoulder, bring it down to the elbow, and note the measurement. Carry the tape round the bent elbow and on to the wrist at the little finger line. Hold the tape over the tip of the elbow, if necessary, to prevent it slipping off. Make sure the reading is taken at the place where hand and arm articulate. To allow for bending the elbow, the wristline of a sleeve is curved, ½in. being added to this measurement at the bottom.

Inside arm to elbow and wrist: With the arm straight, measure from the front tendon joining arm to trunk to the inside of the elbow, and from there to the wrist at the thumb line. The inner arm measurement is always considerably shorter than the outer arm measurement.

Upper arm: Take this measurement with the arm hanging relaxed at the side. Place the tape round the arm horizontally 1½in. below the armpit. Note the measurement, and leave the tape pinned round the arm to be used as a base for the next measurement. Again, on a pattern or garment, ease must be allowed for movement; 1½in. is the minimum ease for the upper arm.

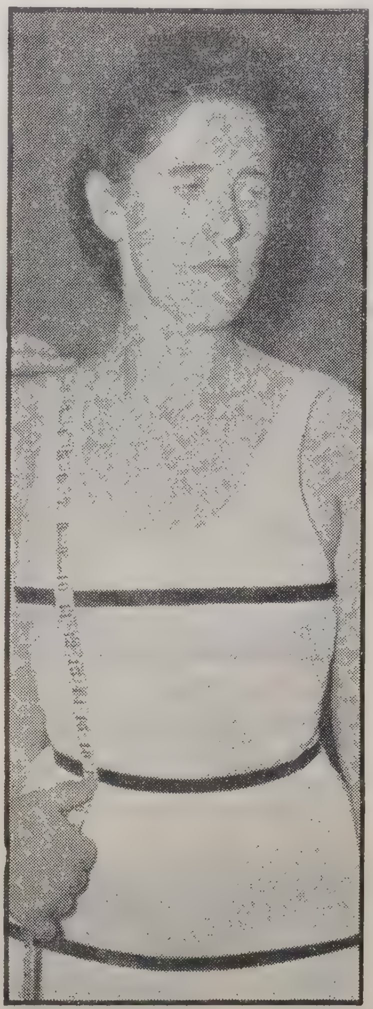
Length of sleeve cap: Measure vertically from the highest point of the shoulder to the tape pinned round the upper arm.

Elbow: Pass the tape round the arm at the elbow, holding it between the first 2 fingers and the thumb, then allow the tape to slip as the arm is bent at right angles, and note the measurement. Take care the tape does not slip off the tip of the elbow. Add 1in. for ease when measuring the pattern.

Wrist: Take this measurement snugly round the wrist, just below the protruding bone at the little finger line. Allow 1in. for ease.

Fitting

A well-fitted garment must allow for freedom of movement and must conform to the body whatever position is taken up. There should be no appearance of straining over the figure, but the garment should not be so loose as to appear sloppy.



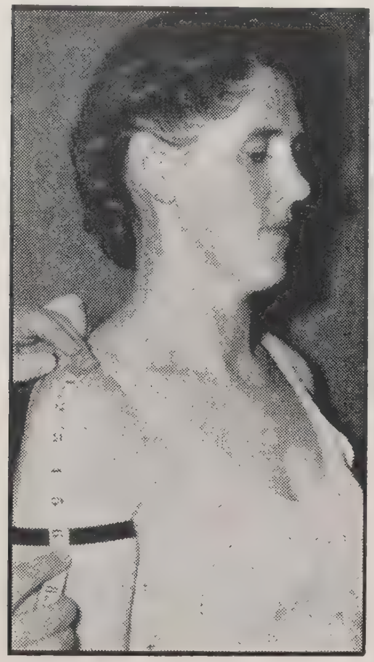
[Jack Welsh and Sons photo.

Measuring the front blouse length, shoulder to waist. The tape passes from the centre of the shoulder line over the bust and then vertically to the waist.

When the parts of the garment are tacked or basted together, test the skirt for tightness by sitting down. Test the ease across the back by folding the arms across the chest, and test the tightness of the sleeves by bending the arms and trying to reach over the head. Adjust the seams where necessary. If there is any doubt about the fit of the pattern, it may be wise to allow wider seams than usual so that there is some material for adjustment when fitting. Fitting should be done with the garment worn over the usual underclothes and with the right side outward. If it is done with the wrong side out, mistakes may be made, for frequently a figure is not exactly the same on left and right sides.

Generally, the seams of a garment should suggest the contour lines of the body. This helps to balance the gar-

MEASURING AND FITTING . . .



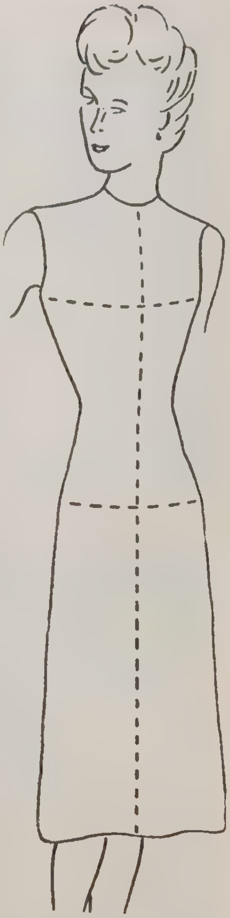
[*Jack Welsh and Sons photo.*

The length of the sleeve cap is measured from the point of articulation of the arm with the shoulder to the bottom of the tape round the arm—in this case 6¼in.

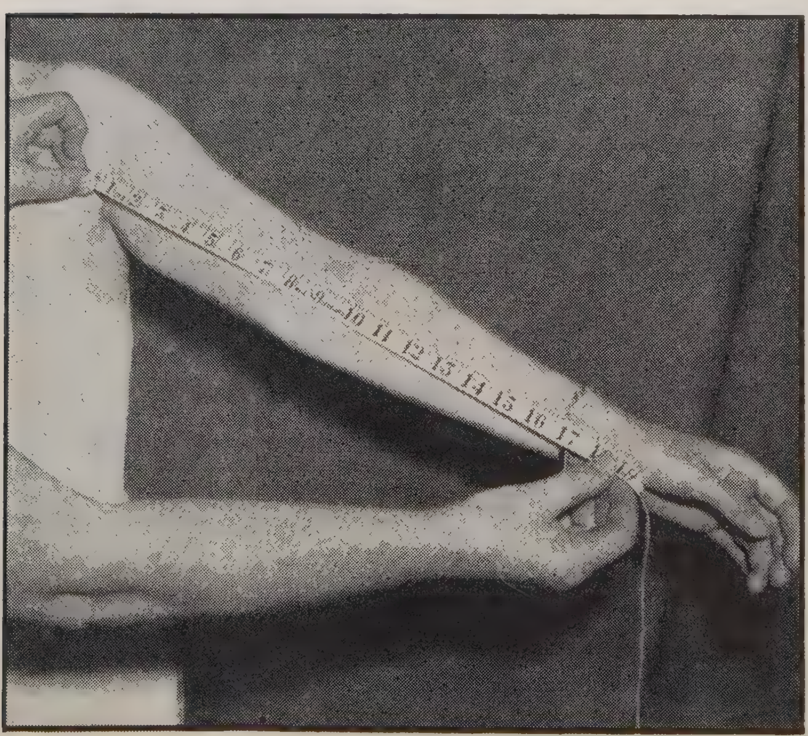
ment on the figure. When the garment is worn and is looked at from the side, the underarm seam should appear vertically beneath the end of the shoulder seam; it should not swing to either front or back. A swing to one side or the other may be corrected by refitting the skirt darts, or by lifting or lowering one or both of the skirt pieces at the waist, to bring the seam perpendicular. The neckline, armseye, and waistline should be in comfortable positions and interfere with movements as little as possible.

The straight grain of the fabric should fall at definite places on the figure. The straight lengthwise grain (or warp threads) should come at the centre front and centre back of the figure, and should be perpendicular. An exception is made if the garment is cut on the bias, when the true bias will fall in the position described. If there are no seams in the centre front and centre back, the straight grain should be marked clearly with a line of running stitches in coloured basting thread. In fitting, this line can be fixed in position by pinning the garment to the underclothes at the bust, waist, and hip, providing a line from which to work. In princess-style dresses or in gored skirts, the straight grain line must be marked on every piece, even though it may not fall on the centre front or back, for the lengthwise straight grain lines must always be perpendicular; if they are not when the garment is first tried on, the seams or darts should be fitted to bring the lines vertical. In the sleeve, the lengthwise straight grain should appear perpendicular, falling from the highest point of the shoulder to the wrist when the arm is hanging naturally at the side.

The crosswise straight grain (weft or filling threads) should be horizontal at bust and hip. Wherever the filling threads are parallel to the floor, the warp yarns should be perpendicular and parallel to the centre front or back. These two lines can be anchored in position by pins and used as basic lines for fitting, the amount of material taken into the seams or darts being adjusted until the fabric fits easily over the figure, with the straight grain falling in the correct places. Do not fit too tightly. It should be possible to pinch up material between the finger and thumb; if that cannot be done, the garment fits too tightly and movement will be restricted.



The lengthwise straight grain marked by a line of long running stitches in the centre front of the garment, and the crosswise straight grain marked at the bust and hips.



[*Jack Welsh and Sons photo.*

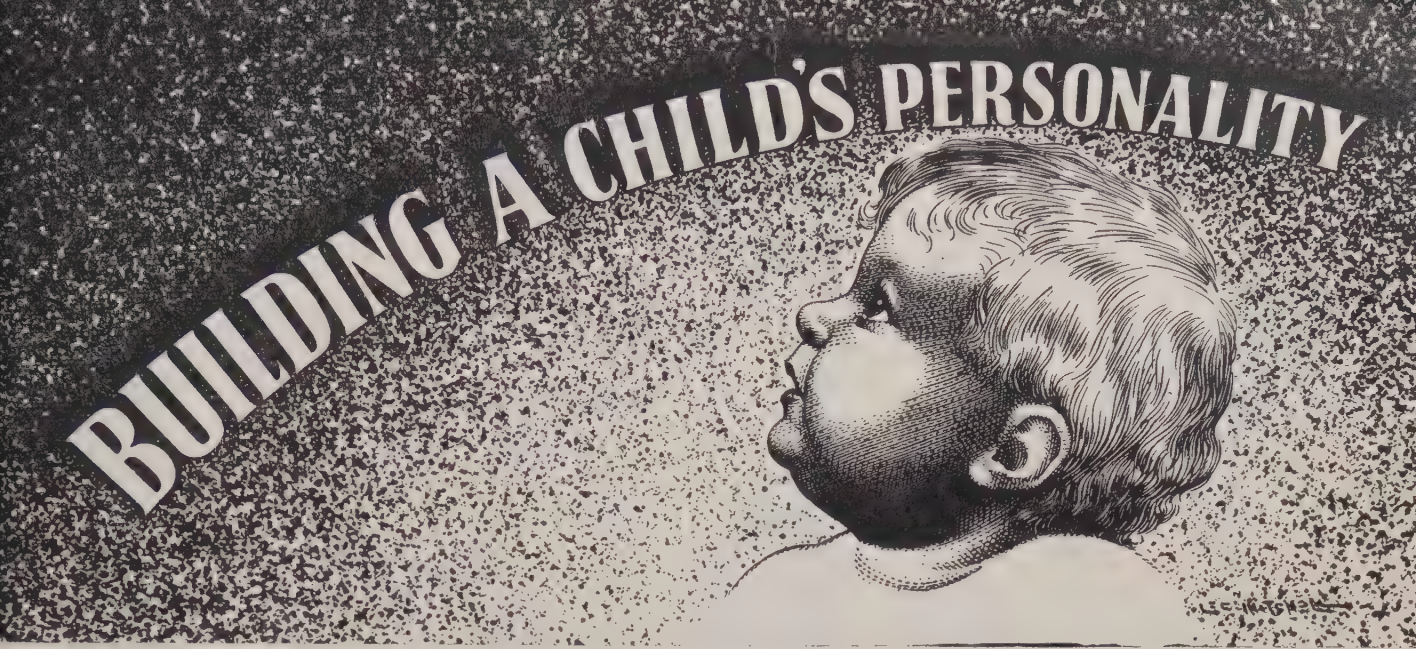
Taking the inner arm measurement—in this case 18in.

After alterations have been pinned in on the figure, the garment is taken off and the pinning replaced by careful basting. The garment should be tried on again before the seams or darts are stitched. It is much better to try on several times if necessary rather than stitch up the garment and have to undo the seams later. Time spent in accurate fitting and basting will be well repaid by better results in the finished garment.

Country Girls' Clubs Conference

THE first Dominion conference of members of the Federation of Country Girls' Clubs, to be held at Diamond Harbour, Lyttelton, will be as much holiday as conference. For four days in August the conference has a programme including discussions of club ideals, objectives, and activities, talks, sight seeing, films, games, and shopping in Christchurch. Girls interested in forming their own club and joining in the conference should write to the Secretary, Federation of Country Girls' Clubs, P.O. Box 3004, Wellington.

BUILDING A CHILD'S PERSONALITY



IN the first article in this series on child care and development by Dorothy Johnson, Rural Sociologist, Department of Agriculture, Christchurch, it was stated that "the intimate relationships of family life may develop social skill or clumsiness, self-confidence or self-depreciation, courage or fear, cordiality or suspicion, generosity or selfishness." Some of the factors which tend to make or mar a child's personality through his emotional experience begin very early in his life and continue through the formal school years. From the explanation given in this article it is hoped that mothers will realise increasingly the value of the right use of the opportunity of these early years with the toys, occupations, and play that figure largely in this period. Later articles will deal with children's play and occupations.

A BABY at birth is unconscious of himself or of the world around him, but he has certain inborn tendencies or instincts through which he begins to adapt himself to his new environment. As his physical needs are at first all-important, he is, so to speak, immersed in bodily sensations and he reacts instinctively to them. Sensations of hunger, pain, discomfort, and cold make him cry out.

Gradually he begins to react to other sensations. He begins to see separate objects. He attends to them, observes them, and forms feelings about them, either pleasurable or painful. There is a purpose in this process of natural development throughout childhood, and if it is understood, parents can help children to lay the foundations of harmonious personalities and of a positive and confident attitude of life.

Emotional Patterns

These emotional patterns are built up within the first 7 years of life and they are the basis of character and disposition all through life. The baby, reacting to sensations, builds up his ideas of life through them. He depends entirely on adults during these early months of his life and if, as is usual, this is accepted as natural and for a purpose, he is given protection and a feeling of security and love through having his bodily needs attended to. Thus he will feel happy and have a confident attitude toward life. He will accept living as natural and pleasant and later he will develop a feeling of joy in life.

On the other hand, if he suffers from illness, indigestion, or too rigid a time-table, the world to him will be unpleasant, even terrifying, making him fearful, miserable, and insecure. This feeling of insecurity can also be the result of a lack of understanding love in his mother or whoever looks after him. It has far-reaching effects later in life, especially in married life. A lack of feeling of affection from the partner, however slight and temporary, may revive this misery and feeling of insecurity. The depression may be out of all proportion to the action of the partner arousing it.

Activities and Sensations

Every activity in infancy is accompanied normally by pleasurable sensations. In this way actions necessary to life go on, and the baby moves about, feeds, and performs other natural functions with much pleasure of the senses. As he develops he begins to have pleasure in watching moving objects—for example, playing with a rattle, and later crawling after balls and toys. His pleasurable feelings are then no longer centred entirely in himself and his bodily activities, but in his activities with objects in the outside world.

This is development in the right direction and will be fostered by pleasurable experiences and frustrated by painful ones. If his experiences are painful, symptoms arise which indicate stresses and strains he is experiencing. Feeling insecure, he attempts to compensate within himself for his unpleasant sensations outside himself. He may suck his thumb and roll his head round to gain pleasurable and comforting feelings which restore his security. (This sort of compensation does not cease at babyhood. Adults can recognise similar reactions in themselves after times of stress. They instinctively seek the familiar and the comfortable to restore their balance or their sense of security.)

For the baby the danger is that he turns inward to himself instead of outward to other objects and people for the fulfilment of his imperative needs if the situation is not understood and remedied. The experience may prejudice his properly loving someone else in later life. He will tend to desire to be loved with the protective love of infancy, and act from an emotional level he has not been able to pass because his early experience was too difficult.

That does not mean that all frustration should be removed from a little child's experience, but that parents should see that the pleasure and satisfaction and the feeling of being loved well outweigh the pain or frustration in any avenue of development believed desirable.

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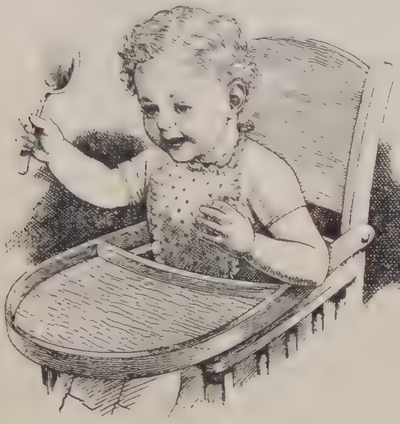
BUILDING A CHILD'S PERSONALITY . . .

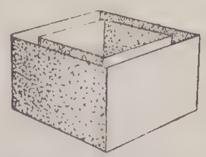
At 9 months old the baby enlarges the scope of his activities, mainly because his world is larger when he can sit up and crawl. He begins by using material objects instinctively and without purpose. Given a spoon, he bangs it on the table, drops it on the floor, or swings it about. Inner urges determine these activities and he merely obeys them instinctively, but in doing so he gains knowledge of the material objects and a realisation of the results of different activities. In this way, by degrees, he learns to plan an action with some knowledge of the end result. His activities in a few simple things then have a purpose. He learns to wave the spoon, purposively, showing delight in the noise and in his own power. The beginnings of deliberate action are apparent.

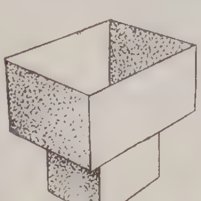


If this natural behaviour is misunderstood and checked too much by anyone on whose love and approval he depends for his security (his mother especially), the child feels at a loss. His natural response to instinctive urges brings him unpleasant results from his mother's displeasure. He feels insecure and therefore anxious or fearful. A conflict arises with which he is unable to deal, so again he tends to go back to a lower or more infantile level of satisfaction; again it may be thumb sucking. The trouble is that this means less activity, fewer opportunities for learning, and lessened confidence. The fact that parents can introduce conflicts into the lives of very small children comes as an unpleasant surprise to them.

Coping with Frustration

How, then, should a child learn to take thwarting and frustration? It should come in a concrete form which he can understand and deal with. When he begins to walk, his range of activities again increases and he is full of curiosity about objects in the external world, though he has no sense of the difference between what is "self" and what is "not self." When his curiosity is aroused by any objects he experiments with them. By his play with them he learns to accept the natural, impersonal laws of a world of 3 dimensions—length, breadth, and depth or height. He learns to distinguish size and shape and other qualities, and he discovers possibilities. For example, he finds that a little box will go into a big box but that no amount of trying or temper will make the opposite possible; that is an important lesson in his emotional development.





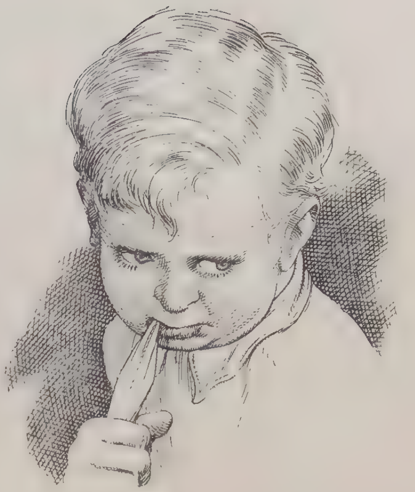
Therefore, it is of the utmost importance that toddlers be given plenty of scope and opportunity to play with all types of material; sand, water, bricks, blocks, and toys which can be pushed or pulled are necessities for good emotional as well as physical and mental development. Faced with difficulties, children try to overcome them, and thus they learn concentration and develop a capacity to make an effort. All small children are uncontrolled, impulsive, and undisciplined, because in every new activity they act at first in response to innate impulses and without the conscious knowledge of the end result. Experience with suitable material gradually adds to their knowledge and in doing so tends toward control of their impulses. "There is within the child a natural tendency to harmonise his impulsive tendencies by their direction to a common end" (Dr. Hadfield).

Dangers of Too Much Restraint

During the early toddler period the child is engrossed in his own activities to the exclusion of everything and everyone else and, as he has no idea of "self," he is not being perverse or obstinate in any conscious sense. This phase causes many difficulties for both the child and his parents. Coping with his intense interest in coal dust or in turning on the bath taps is difficult, for attempts at prevention usually bring screams. These interests from his point of view are right and normal; it is the parents who find them annoying. Another interest will distract his attention.

He can be helped to accept laws in relation to behaviour as well as in relation to concrete things. He should always be given in play plenty of scope for the expression of his energies, and he should be taught how to do things it would be dangerous for him to learn from trial and error. Above all, it is necessary to avoid thwarting him unnecessarily in his normal activities, but to be quite firm when thwarting is necessary. In this way, children learn many things from their own experience and some things from definite teaching.

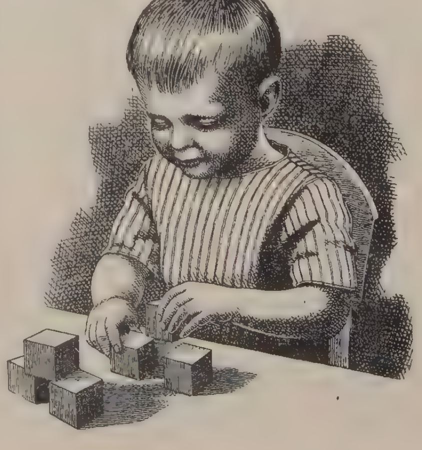
Self-control and self-discipline are developed through the restraint which at times must be accepted, but again there is a grave danger if a child of this age is too much thwarted or misunderstood. He may give in completely through fear of punishment and go back to a more infantile stage, sowing the seeds of a personality lacking will power, initiative, and concentration. He may react with rebelliousness and bad temper, which become part of his disposition and character and the method by which he gets his own way; his character may become fixed in this self-willed phase. The third danger comes through a combination of these two results. If he feels rebellious but represses it through fear of consequences, a feeling of hate toward those in authority develops and comes out in abnormal ways—often through fears. That spoils his capacity to make happy relationships with others.

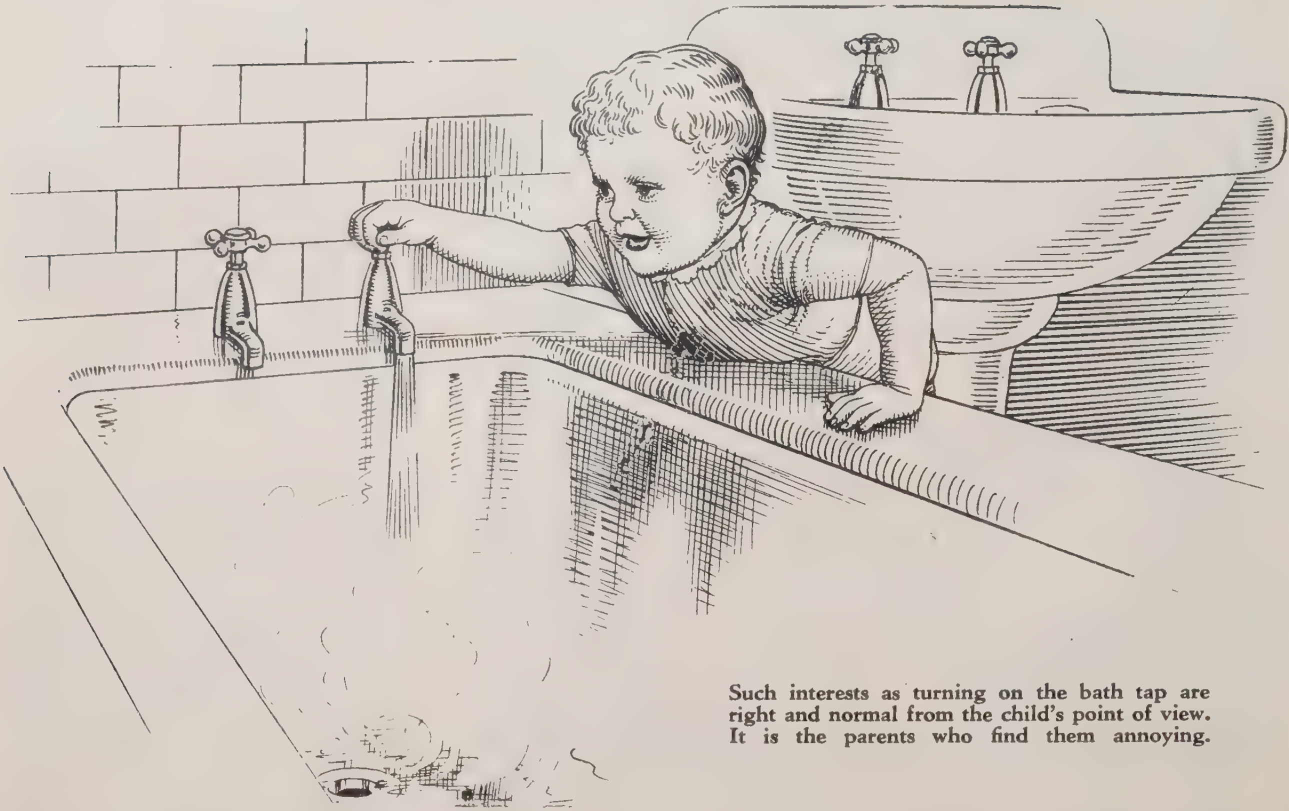


The "Showing-off" Period

Normal development proceeds by the child becoming interested in people. After his second birthday he begins to watch and imitate others, and in his play he reproduces and carries through the activities of everyday life. At first he plays alone, but gradually, through discovering how much more can be done with trains and carts and horses when 1 or 2 other children play with him, he learns to co-operate with others.

At about 3 years, he begins to be conscious of himself as a separate person. He begins to distinguish between the "self" and the "not self." This phase is often associated with a good deal of what appears to be "showing off." He builds a brick tower or a





Such interests as turning on the bath tap are right and normal from the child's point of view. It is the parents who find them annoying.

house; he realises that the structure is the result of his work and naturally he is proud of it; "Look what I have done," he says with emphasis on the "I," not on the work achieved. But by it he is accepting the fact that he alone is responsible for the result, and that gives him the confidence he needs to go on. To strengthen this security and confidence by casual praise is a much more constructive attitude on the parents' part than to "squash" the child because they imagine he is becoming vain or boastful. Far from curing the trouble, a real injury is done to him by creating a conflict. He must have the security of his parents' approbation. That means he must contrive to please them with what he does, so whereas at first all his energies were absorbed in what he was doing, his aim can now be divided between that and trying to do something to please his parents. He no longer has confidence in himself. He is hindered in developing a sense of values or discrimination in what he does. He tends to become dependent on other people's opinions, always appealing to them either consciously or unconsciously for approval.

Emphasis on Achievement

From the "showing-off" period the child passes to a phase in which achievement is all-important. Using corks, softened peas, match sticks, match boxes, plastic modelling material, clay, paper, clips, and similar materials, large numbers of primitive models and drawings can be achieved by the child. These need to be finished quickly so that he sees the result before he is tired of them. That encourages him to make fresh efforts and concentrate on better and better achievements. It is quantity that matters at first, but by the time he is 9 years old his interest has gradually shifted to quality. He becomes critical of his work and invites and accepts constructive criticism of it from others.

That is a very positive achievement, but still it can be spoilt by too much criticism or too little appreciation. The child still needs the satisfaction of achievement to spur him on to further effort. It is apparent failure to him if it is unaccepted or unappreciated by his parents.

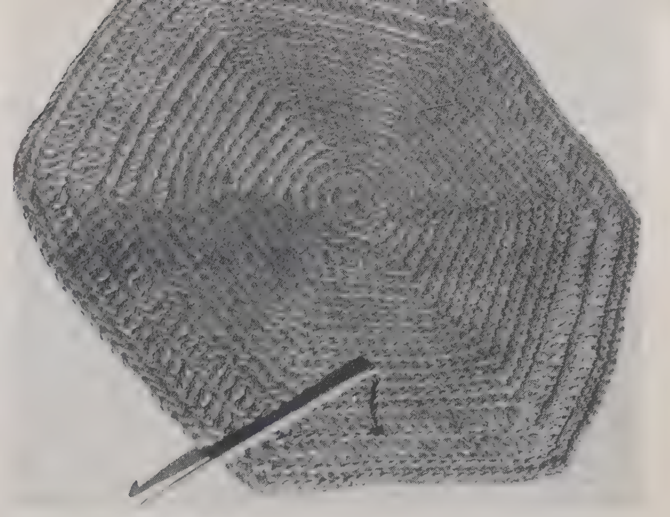
Over-conscientiousness is a drawback to some children who always want to make the perfect object; as only imperfect work is possible at this stage, they are constantly discouraged and fly from task to task, leaving each unfinished. Some others will give up all effort under criticism in a reaction similar to that at an earlier stage. They retire to the world of dreams and make-believe where all things are possible and perfect and dominated by them. That brings difficulties in the 'teen age, when circumstances force them to come down to reality or, remaining dreamers, they seem to be colourless and useless in actual life. (There are people such as Francis Thompson, however, whose poetic insight has made a great contribution to understanding.)

Developing Personality

Any difficulties which overwhelm a child cause him to slip back to an earlier phase of dependence and hinder the trend of his development toward self-confidence and independence. The aim is to help in the development of a strong but harmonised personality and to help the child to accept the tendencies which are his by instinct as right and good insofar as they are directed to useful ends and purposes. They form the basic energy for the child's developing personality, and through the gradual development of self-discipline and self-control he becomes a master of this energy, which he can use consciously in any creative activity, be it work, play, or social relationships.

The spirit of the parents' approach is all-important: It must be one of continuing friendliness and love. The child must know beyond any cavil that the parents are on his side. Adults and their children motivated by a real love ideal, in its broadest sense, cannot easily be bad tempered, intolerant, or delinquent or behave in ways which hurt others.

Crochet Floor Mats are Quick and Cheap to Make



A crochet binder-twine mat and the hook, carved from an old dish-mop handle, with which it was made. This mat has been in use as a front door mat for several years and shows no noticeable signs of wear. It is 6-sided, not 7-sided as advised in this article. To make this lie flat extra increasing had to be done at the points, and the radiating increase lines in consequence are irregular. Two treble rounds just before the last round of doubles form a border.

THOUGH carpets and mats are now more plentiful in the shops than during the war, they are as expensive as ever, and even bedside and smaller floor rugs tend to cost several pounds more than most people are prepared to pay for them. Many country women solve the problem by making rag mats, but each one may take 2 years of winter evenings to complete, and the maker may become tired of it almost before it is put into use. Very quickly and easily made in comparison are crochet mats, using either binder twine, or yarn cut from old stockings or worn locknit underwear, and a home-made wooden crochet hook. Their making is described in this article by Eirene E. Unwin, Rural Sociologist, Department of Agriculture, Dunedin.

CROCHET floor mats do not give quite the lasting wear that the ordinary rag mat with a pile does, but they are very much quicker to make, cost very little, and wear a surprisingly-long time. Because they are fairly open dust shakes out of them easily, and they are not heavy to handle or shake. Mats for almost any purpose can be made—bath mats, door mats, kitchen mats, bedside or hearth rugs—and they may be produced to suit any existing colour scheme, as binder twine, stockings, and some locknit dye easily.

[The making of the basic stitches in crochet work was described and illustrated in an article by Eva Topping in the "Journal" for May, 1948.]

Dyeing the Material

Plain new binder twine is itself a very attractive colour and is quite suitable for mats to be used on a verandah, at the door, or in front of tubs, sink, or range. For all that it has the advantage of not showing dirt readily and of being easily washed when it does. As it becomes older it fades to a neutral fawn, but if coloured mats are preferred, they may be dyed quite easily with commercial dyes. The twine should not be dyed before being made up; only the finished mat should be attempted, and a large container is needed, as the binder twine is somewhat stiff and awkward to stir. However, the task is not as difficult as it may seem.

The pastel tints of locknit underwear are quite suitable for a bath mat, but the colours of stockings would be difficult to fit pleasingly into any colour scheme, so they are better bleached and dyed. Any locknit that can be pressed with a hot iron without it crinkling or sticking may also be dyed, but any that does crinkle or stick will not take ordinary dyes satisfactorily.

The material should be bleached and dyed before the garments are cut up into yarn, but the feet of the stockings may be cut off first, as they are best not used. Any commercial dye stripper suitable for artificial silks may be used to remove the original colour. The material must be bleached before being redyed or the new dye, combining with the different base colours, will produce different final colours. In any case the different materials of stockings may take the dye differently—the cotton tops of rayon stockings may come out much darker than the legs—but usually the colours will blend quite well; if not, they may be used separately. For both bleaching and dyeing the directions given by the manufacturers should be followed.

When choosing colours to use together in one mat, care must be taken that they blend well. A safe rule is to use the brightest hues in the smallest quantities and the duller ones over the larger areas. An attractive effect can be produced with several variations of the one kind of colour ranging from quite pale to quite deep—for example, pale pink, pink, deep pink, medium crimson, and deep crimson.

To produce these variations in dyeing is easy. Divide the material to be dyed into as many lots as required, make up the dye bath for the deepest shade, and dye each lot for a different length of time—the longer the time the deeper the resulting colour. For instance, for 5 variations put the lot to be dyed the deepest shade in first by itself; when somewhat less than a fifth of the correct dyeing time has gone by, put in the next lot; after less than another fifth of the time, put in the third lot, and so on. The last lot will thus be in the dye only about a quarter of the time and will come out quite pale; those immersed for successively-longer times will come out successively deeper. (If it is found that the dye bath is cooled down too much by this method, wet each lot of material in hot water before putting it in.) If the full fifth of the dyeing time is left before each fresh lot is added, the first 1 or 2 would probably take up more than their share of the dye, leaving far too little for the later ones.

By arranging the series of colours in different orders very pretty effects can be produced and there is much scope for experimenting both with dyeing and with the arrangement of colours.

Preparing the Yarn

Cut the stockings or locknit in long strips about an inch wide spirally round the garment. When such a fabric is cut at right angles to its length the cut edge curls up, forming the strip into the equivalent of a cord. Ladders do not matter, but if a bad hole is encountered, it would be better to break off the strip and begin again, for the holes if left would mean a weak place in the yarn. Wind the strips into balls as they are cut.

The ends of the pieces may be sewn together on a sewing machine to make a continuous yarn, or each new piece may be joined in while making up the mat and the ends crocheted over or run in afterward. They could even be knotted together, but this would make a lump and the knot would tend to show in the finished mat.

Making the Crochet Hook

Well-seasoned, close-grained, tough wood should be selected for the crochet hook. The handle of a cheap dish mop serves very well. Straight ones are better than the shaped ones, which are found only on more expensive mops. Buying a new mop for the purpose is not necessary, as an old worn-out one is perfectly satisfactory. Wooden meat skewers are also very tough wood, but are a little too fine for use with binder twine, though a hook made from one might do for locknit or stocking yarn.

Anyone handy with a penknife and file will not find cutting the hook to shape a difficult task. It is best finished off with sandpaper, as it must have a perfectly-smooth surface. With careful use a wooden crochet hook will last for many mats.

PATTERNS FOR CROCHET FLOOR MATS . . .

In theory the mats may be almost any shape, but in practice it is much easier to make a 7-sided mat than a round one and a straight-sided, pointed one than an oval, though one very nearly oval may be made by working backward and forward instead of round and round. The difficulty in making a round or oval mat is that of increasing just sufficiently to make the finished mat lie flat. If too many increases are made, the mat will buckle; if too few are made, the edges will curl up; hours of experimenting might be required to make a perfectly-round flat mat. However, 7 increases in each round have proved satisfactory, and the easiest way to make them is to increase at 7 definite points in each row. Once the mat is begun correctly no counting is necessary, and the resulting mat is so nearly round as to be quite satisfactory.

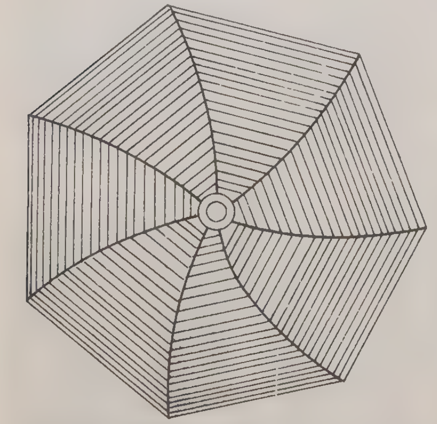
Directions follow for 4 different mats, and locknit or stocking yarn or binder twine may be used for any of them. A new ball of binder twine should be used, not old twine from sheaves, which would contain far too many knots and too many loose fibres to get in the way.

Abbreviations used are:—Ch. = chain, d.c. = double crochet, tr. = treble.

SEVEN-SIDED MAT

First round: Loop the yarn twice round the fingers, then, holding the loop in the left hand with the short end to the right and the long end in front and to the left, work 7 doubles into the loop. Pull up the short end so that the ring is quite tight. The end may be cut off afterward without further running in.

Second round: Work 2 d.c. into each stitch, working through the back thread only and making 14 stitches in all. Continue working through the back thread only throughout, as this makes a better pattern.



Third round: Work 2 d.c. into the 1st stitch and 1 d.c. into the 2nd. Repeat to the end of the round.

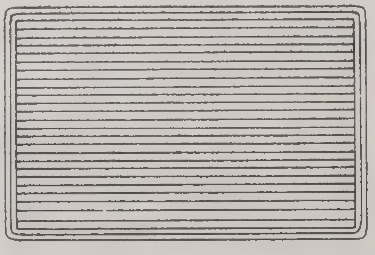
Fourth and following rounds: Wherever 2 doubles were worked into 1 stitch in the previous round, work 2 d.c. into the loop between them, and work 1 d.c. into every other stitch. As each increase is made directly over an increase in the previous round this very soon gives the mat 7 points, and it is easy to continue increasing at each point in every round. It may be necessary occasionally to increase 3 times into 1 stitch instead of only twice if the edges of the mat curl up badly; this will depend on the thickness of the crochet hook compared with the yarn and on the tension. If this extra increasing is done at the same point in 2 consecutive rows, the sides will soon become uneven, so space the extra stitches round the mat.

A binder-twine mat will appear to curl up a little when it is still quite small, but that is caused by the stiffness of the twine; it will flatten out as the work proceeds. Should more than 1 or 2 outer rows continue to curl as the mat grows larger, more increasing should be done.

It is best to work in double crochet throughout, though 1 or 2 rows of trebles may be put on at the outside as a border. Making the whole mat in trebles causes it to be of a much looser fabric, which does not wear so well. Any treble row will require at least 3 stitches together at each point.

Make the mat as big as required, and finish off at a point with one single crochet. Run in the end.

RECTANGULAR MAT



Crochet a loose chain about as long as one side of the finished mat and turn.

First row: Work 1 d.c. into the 2nd ch. from the hook, picking up 2 threads. Continue with 1 d.c. into each ch. to the end. Make 1 ch. to lift the thread up ready for the next row. Turn.

Second row: Work 1 d.c. into the front thread of each stitch to the end, and finish with 1 ch. as before.

Third row: Work 1 d.c. into the back thread only of each stitch to the end; 1 ch. Turn.

Repeat the last 2 rows until the mat is nearly as wide as required. The reason for working into the back thread when the right side is facing and the front thread when the wrong side is facing is that by this means the other thread is always left on the right side of the material. This makes a flatter mat than if the back thread only were taken throughout, making definite ridges, and a more attractive pattern than if both threads were taken, though this makes a very firm material. The flattest fabric of all is made by working always into the front of the stitch, though this is more open than the others. Any of the 4 patterns may be used, though probably the ridgy one is least suitable for a mat.

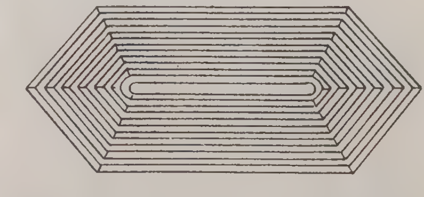
Finish with a row on the right side, and then continue across the end of the mat and on right around it for a border. Doubles or trebles may be used, but at each corner at least 3 d.c. or 5 tr. must be worked into the corner stitch. Begin the border with these 3 d.c. into the 1 stitch and then pick up stitches across the end. It will be found that picking up a stitch at the end of every row is too many, making the border too full to lie flat, but picking 1 up at the end of every second row is too few, so that the border curls up. It is best to leave out 1 row-end every few stitches, but care must be taken to pick up the stitches across the ends as neatly as possible and not to leave any holes. If too many border rounds are attempted, the corners will tend to become round, not square, but this may not matter.

If any treble rows are included in the border, it is best to begin each row with 3 ch. in place of the 1st. tr. and when the row is completed to join to the 3rd of the ch. with a single crochet; then, if another row is to be made, begin again with 3 ch. By this means a step at the end of the final row is avoided and it is easy to finish off the border neatly and symmetrically. It is possible to do the same with doubles, taking 2 ch. instead of 3, but a double makes such a small step that if the border is finished off with a single crochet at a corner, it is scarcely noticeable.

MAT WITH POINTED ENDS

Decide on the approximate dimensions of the mat and work out how much greater the total length is to be than the width. Then crochet a loose chain a little longer than this difference. Turn.

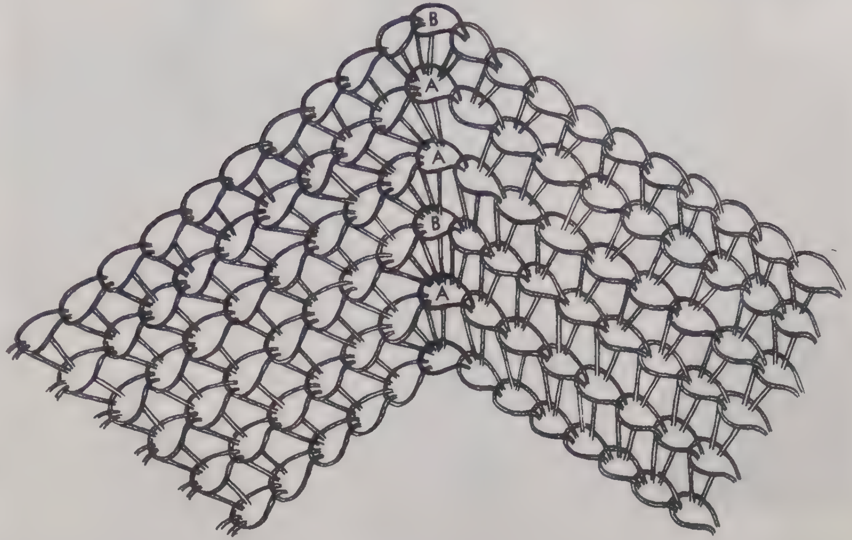
First round: Working in d.c. and beginning into the 2nd stitch from the hook, continue back to the beginning of the chain, picking up 1 thread only of each stitch. Take 3 d.c. into the end stitch of the chain and continue in d.c. down the other side of the chain, again picking up only 1 thread of each stitch. Finish the round by working 3 d.c. into the loop made by the 2 spare ch. at the end. From then on crochet always into the back thread only of each stitch.



Second round: Work 1 d.c. into each stitch down the sides and 2 d.c. into each of the 3 stitches at either end.

Third round: Continue in d.c. down the 1st side and work 3 d.c. into the loop above the 1st stitch of each pair of d.c. at the end. The increasing is done into the loop above the 1st stitch of the pair in the previous row, not into the loop between the 2 stitches; this is the rule throughout when increasing over a pair of d.c. in the previous round (A in the diagram). Continue in d.c. back along the other side of the mat, but work only 2 d.c. into the loops above the 1st stitch of each pair at this end.

Fourth round: Continue in d.c., and round the 1st end work 2 d.c. into the loop between the 1st and 2nd stitches



The loops into which increases are made at the points of the mat with pointed ends. A indicates the loop above the 1st stitch of the pair in the previous row, and B the loop between the 1st and 2nd stitches of a set of 3 in the previous round.

of each set of 3 d.c. in the previous round. Increasing into this loop is the rule throughout when increasing over 3 d.c. in the previous round (B in the diagram). At the other end work 3 d.c. into the loop above the 1st stitch of each pair of d.c. in the previous round.

Fifth round: Work right round in d.c. increasing at the points with only 2 d.c. in each case, obeying the rules given when choosing the loop into which to work the increases.

Repeat rounds 3, 4, and 5 until the mat is as big as required. A round of 2 of tr. may be used as a border, in which case 3 or 4 tr. may be needed to increase sufficiently at each point on each round. Begin each tr. round with 3 ch. as described for the border of the rectangular mat.

The instructions for increasing—that is, the 3 pattern rounds—may be summarised as follows:—

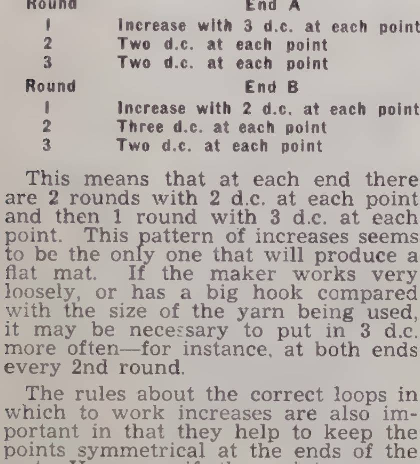
Round	End A
1	Increase with 3 d.c. at each point
2	Two d.c. at each point
3	Two d.c. at each point

Round	End B
1	Increase with 2 d.c. at each point
2	Three d.c. at each point
3	Two d.c. at each point

This means that at each end there are 2 rounds with 2 d.c. at each point and then 1 round with 3 d.c. at each point. This pattern of increases seems to be the only one that will produce a flat mat. If the maker works very loosely, or has a big hook compared with the size of the yarn being used, it may be necessary to put in 3 d.c. more often—for instance, at both ends every 2nd round.

The rules about the correct loops in which to work increases are also important in that they help to keep the points symmetrical at the ends of the mat. However, if the points appear to be working a little backward round the mat as it grows, it may be necessary to work the increases occasionally into the next loop along.

NEAR-OVAL MAT



Like the rectangular mat, a mat which will be approximately oval is worked backward and forward, but the rows are increased in length, then kept steady, and then decreased, so that rounded ends are produced. Any of the 4 stitches described in the directions for making the rectangular mat may be used.

Begin with a chain about a third as long as the total length of the finished mat, turn, and d.c. back to the beginning, working the 1st d.c. into the 2nd ch. from the hook. At the end of the row work 3 ch. instead of the usual 1, and begin the return row of d.c. by working into the 2nd chain from the hook, thus adding 2 stitches to the beginning of the return row. To lengthen the other end, work twice into each of the last 2 stitches and then turn with 3 ch. as before to lengthen the beginning of the following row.

Repeat this, increasing at each end of every row until nearly a quarter of the width of the mat has been worked. Then increase less rapidly by making only 2 ch. at the end of each row and working twice into 1 end stitch only, thus adding only 1 stitch at each end instead of 2.

When the work measures not quite half the total required width, work several rows without any increasing, making only 1 ch. at the end of each row and working the first d.c. into the last stitch of the row just completed, as for the rectangular mat.

Then decrease 1 stitch at each end of every row. At the beginning of each row crochet the 1st 2 stitches together as 1 and at the end crochet the last 2 stitches together. Turn with a single chain. When sufficient rows have been crocheted thus to correspond with the 2nd lot of increase rows, begin to decrease 2 stitches at each end of every row. At the beginning skip the 1st stitch and crochet the next 2 as 1, and at the end crochet together the 3rd last and 2nd last stitches and leave out the last stitch. Turn with 1 ch. Continue until sufficient decrease rows have been worked to correspond with the increase rows, and then, with the right side facing, work the border, as follows:—

Work 1 row of d.c. right round the mat; round the ends, work into the end of every row at least, and if necessary into the stitches between the rows as well. At A in the diagram, where the flat end begins and where there were no increases or decreases, it may be necessary to work 2 d.c. into 1 stitch, and similarly into each of the other "corners" (B, C, D, E, F, G, and H). The second border round may be in d.c. or tr. The result is prettier if only the back thread of each stitch is worked into, but both threads may be picked up if this matches the rest of the mat. If more than 2 stitches are worked into any 1 loop when increasing, a "corner" tends to be produced; to avoid this, and to preserve the oval shape of the mat, it is best to increase into 2 or even 3 consecutive stitches instead of all into 1. As many rounds as are liked may be worked, provided the border is kept flat. If too little increasing is done, it will curl up; if too much it will "frill." It is as well to begin each tr. round with 3 ch. in place of the 1st tr., as described for the rectangular mat, to avoid a "step" when finishing off.

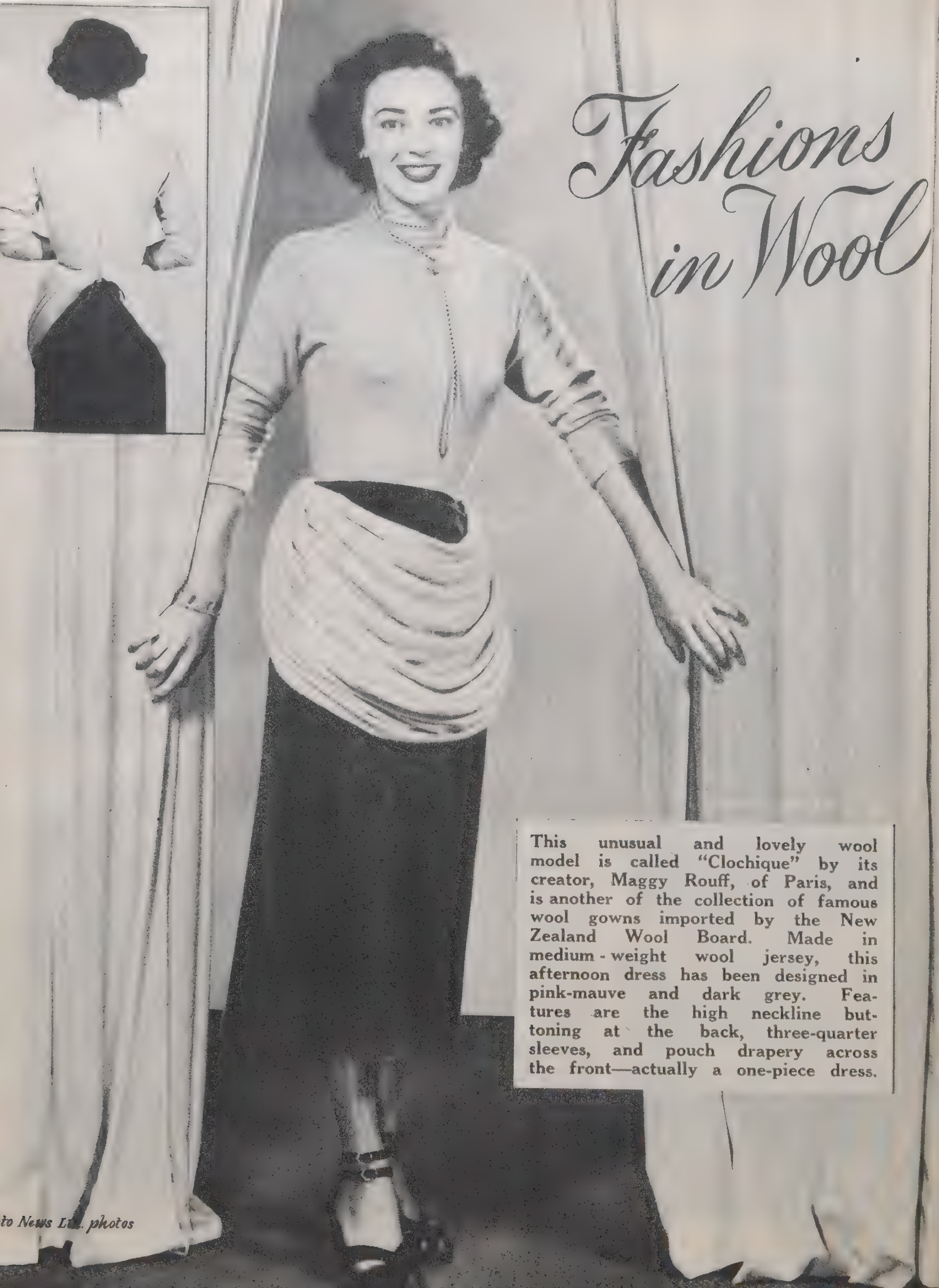
Finishing the Mats

The mats may be lined with sugar bag or other strong material, but it is doubtful whether this is a real advantage. It makes them heavier and not so easy to clean, as the dust falls through an unlined mat but would be caught by a lining. The mats wear so well that linings are not necessary to make them last longer.

If it is found that they slip on the floor when in use, sew a used jar ring to the underside at each corner. These prevent the mat from slipping even on polished linoleum and will be found a boon on other mats as well as these home-made ones.

Many people who crochet borders for their embroidery have never attempted anything made entirely from crochet, but the only stitches needed for these mats are the 3 basic ones—chain, double, and treble. Anyone who can do these, who can procure a home-made large wooden hook, and who can provide herself with stockings or locknit yarn, or a ball of new binder twine, can set to and make for her house as many crochet mats as she wishes. She will be delighted at the rate at which each mat grows once she has started.

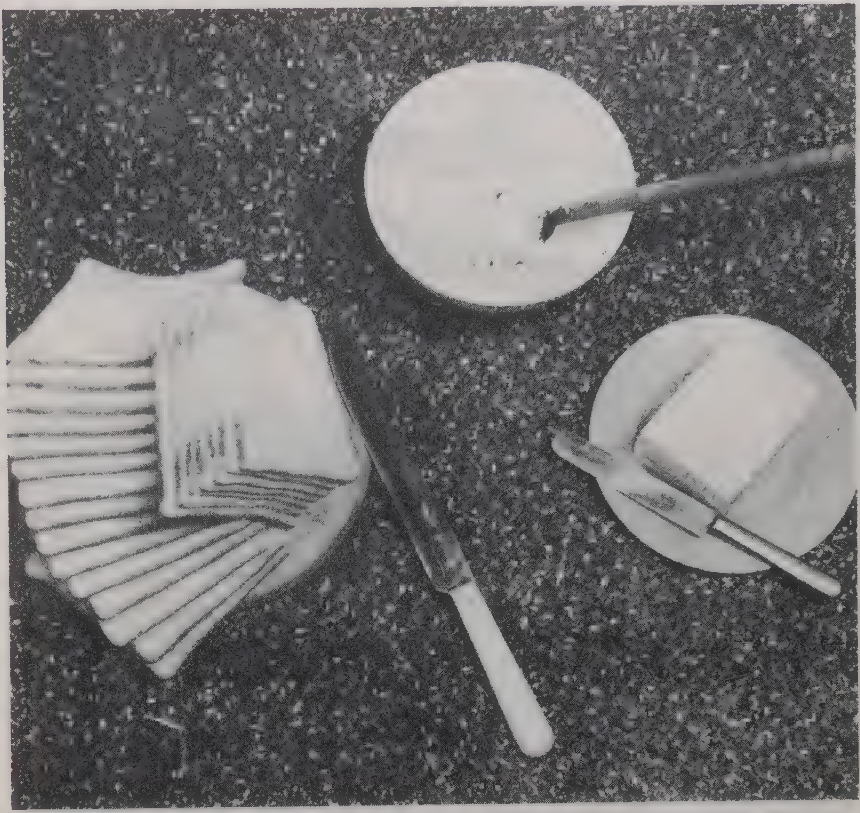
Fashions in Wool



This unusual and lovely wool model is called "Clochique" by its creator, Maggy Rouff, of Paris, and is another of the collection of famous wool gowns imported by the New Zealand Wool Board. Made in medium-weight wool jersey, this afternoon dress has been designed in pink-mauve and dark grey. Features are the high neckline buttoning at the back, three-quarter sleeves, and pouch drapery across the front—actually a one-piece dress.

to News Ltd. photos

SANDWICHES *and* SAVOURIES *with* BREAD *as a* BASE



NEW ZEALAND housewives are justly noted for their baking, the results of which appear in all their luscious perfection in the afternoon teas and suppers provided for social occasions. However, sometimes less elaborate fare is appropriate, with the emphasis on savouries rather than on sweet cakes and biscuits. This article by Norma K. Metson, Rural Sociologist, Department of Agriculture, Wellington, describes attractive refreshments which can be prepared using bread as a base.

ANYONE can make ordinary sandwiches, but the use of brown and white breads, fancy cutters, and originality in the blending of fillings produces delicious combinations far removed from the usual tomato (with salt and pepper), ham (with mustard), and egg (with chives). Fresh bread is preferable in flavour and texture, but is difficult to cut neatly and uniformly, so unless sliced bread can be obtained from the baker it is easier to use a day-old loaf. If the bread is to be rolled, however, as for asparagus rolls or pinwheels, the softer fresh bread is essential. When the savouries are to be cooked, or the bread toasted or fried, quite stale bread may be used without detracting from the finished product.

The shape of the loaf to some extent determines the shape of the sandwiches. If a sandwich loaf with its easily-divided square slices is unobtainable, planning for rectangles or fingers is better than wasting bread trying to make symmetrical triangles or squares. By cutting along the bottom of a tin loaf it is possible to get quite regular slices instead of the usual oddly-shaped ones. Crusts should not be cut off unless they are burnt or very tough or the bread must be rolled.

To keep sandwiches fresh they can be wrapped loosely in a damp cloth, or firmly in waxed paper, and stored in a cool place, a refrigerator if possible. If the sandwiches are to be made some time before use, the bread may be buttered and the fillings put in, but the cutting should be left until the last minute.

Preparing the Butter

Butter is not essential, as mild dripping well seasoned can be used in savoury sandwiches, fried bread will form a base for canapes, and fillings such as cheese and bacon which contain fat make butter unnecessary in grilled or toasted savouries. Butter must be soft before use or it will not spread satisfactorily on thin bread, but it must not be melted; reclamation is impossible once the oily stage is reached. The butter should be put in a bowl, cut into small pieces, and left in a warm place to soften slightly. Hot water (2 tablespoons to 4oz. of butter) is then added, and the mixture beaten well until the butter is soft and creamy and some of the water has been absorbed; surplus water must be poured off. Butter treated in this way will spread more easily, go further, and stay soft longer than when it has merely been softened by heat.

The use of savoury butters, made by additions to butter creamed as described, is a good way to introduce new flavours and make ordinary fillings more interesting. For example, lemon butter may be used with fish, mint with dates or raisins, and parsley and onion with cheese. Following are suggestions for savoury butters, but many other additions are possible; in each case the ingredients should be added to ½ cup of well-creamed and softened butter:—

Lemon butter: ½ teaspoon of grated lemon rind, 1 teaspoon of lemon juice, and a dash of cayenne pepper.

Parsley and onion butter: 1½ teaspoons of finely-chopped parsley and ¼ teaspoon of onion juice or onion food flavouring.

Mint butter: 1 tablespoon of finely-chopped mint leaves.

Horse-radish butter: 1 tablespoon of finely-grated horse-radish and a few drops of lemon juice.

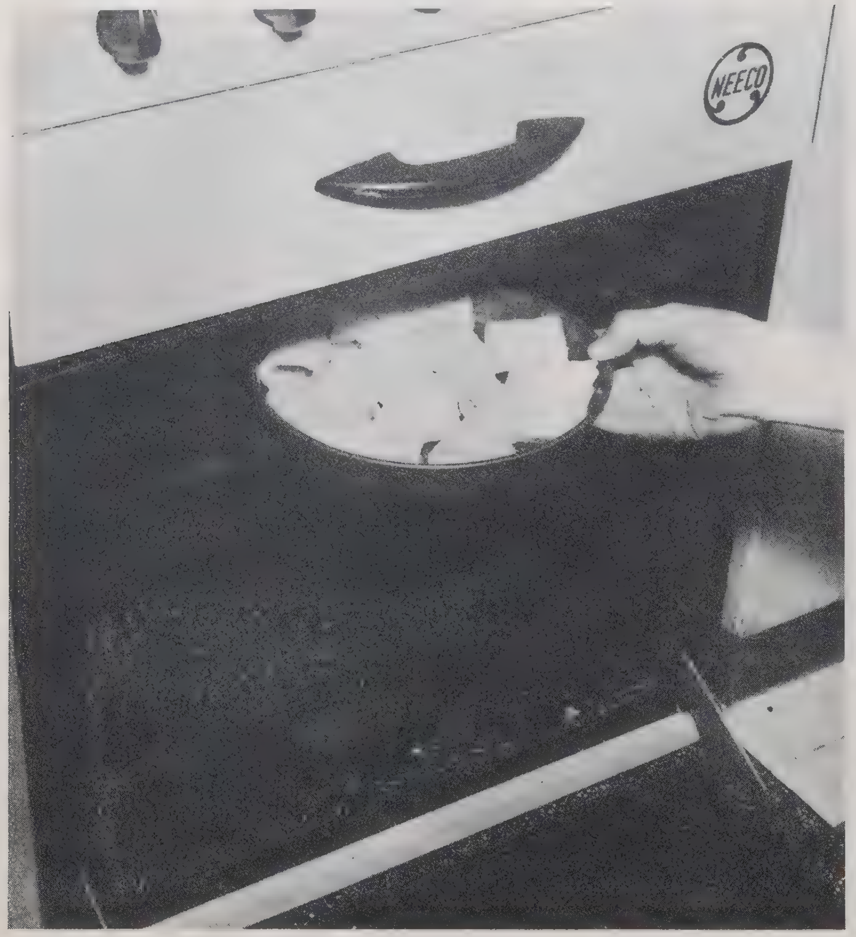
Anchovy butter: 1 teaspoon of anchovy paste and a dash of cayenne pepper.

Serving and Garnishing

Appropriate garnishes and careful serving do much to add to the attractiveness of a supper table and to the enjoyment of the food. Beds of lettuce leaves, crisp and curled, and sprigs of dark green parsley are easy to obtain and arrange. Thin slices of lemon, olive, radish, cucumber scored with a fork, and Chinese gooseberry make interesting patterns and bright colour contrasts.

Small signposts—a strip of card on the end of a toothpick with the sandwich filling printed on it—look decorative and prevent guests from selecting unawares a filling they do not like. Arrange sandwiches in blocks with different coloured fillings showing, or make patterns by using brown and white bread alternately.

SANDWICHES AND SAVOURIES



Cheese rolls being placed in an oven to be baked.

Canapes

Canapes, or open-faced sandwiches, have a base and filling on only one side. The base may be buttered bread, bread toasted on one or both sides, or crisp fried bread. The filling should be moist enough to contrast with the crispness of the base, but not so moist that it soaks into and softens the bread. Spread the base with plain or savoury butter and top it with one of the following mixtures or something similar:—

Hard-boiled egg, chopped, seasoned, and slightly moistened with salad dressing.

Smoked or tinned fish sprinkled with lemon juice or used with lemon butter.

Soft, spreading cheese—cream cheese, or ordinary cheese, grated and blended with a little top milk.

Savoury paste—meat, fish, or gherkin, well seasoned.

Garnish these with something that will give a colour contrast—a dash of red paprika pepper, very finely-chopped egg yolk, egg white, parsley, a slice from a red radish, an olive, or a tiny pickled onion.

Cheese and bacon savouries, always popular, are made like canapés and then cooked in a hot oven for 10 to 15 minutes. Take 2 cups of grated cheese, season it well with salt and pepper, and moisten it until it sticks together with an egg yolk and a little top milk, sour cream, tomato sauce, or salad dressing. Spread the mixture on fingers of unbuttered bread about ¼in. thick and put a strip of fat bacon on top. Cook them and serve them hot.

Toasted Cheese Rolls

Take strips of thin soft bread, butter them, spread them with soft cheese, and roll them up. Place them close together in a dish to keep them in shape and bake them in a very quick oven until they are golden brown.

Fancy Sandwiches

Checkerboard and ribbon sandwiches: Cut an equal number of white and brown slices ½in. thick. Remove the crusts, spread the bread generously with savoury butter, and place 5 slices of alternate colours together. The top and bottom slices are buttered on only one side and the intermediate ones on both sides. Make another group of 5 slices, reversing the order of the bread. Then butter and cut ½in. slices from each striped group and place them together so that colours of bread again alternate. Wrap them in waxed paper and chill them. Just before serving the sandwiches, cut them into thin slices. Ribbon sandwiches are made by cutting thin slices from the striped groups.

Pinwheels: Cut slices from the loaf longways and spread them with butter and a filling of creamy consistency. Roll up the slices (the bread must be soft and fresh or it will crack) and leave the rolls in a cool place. To serve, cut the rolls into ½in. rounds with a sharp knife.

Club sandwiches: First work out a combination of 3, 4, or 5 fillings that go well together—for example, peanut butter, grated apple with lemon juice, and honey; vegetable extract, creamed cheese, chopped egg, and tomato paste; finely-cut lettuce moistened with dressing, grated raw carrot, chopped nuts with parsley, meat paste, and chutney. One more slice of bread than there are fillings is required. Butter 2 slices, for top and bottom, on only one side and the others on both sides. Pile layers of filling and bread alternately, then leave the piles wrapped in wax paper and with a weight on top for several hours. The weight should be evenly distributed; a flat baking dish can be put over the sandwiches and a heavy book on that. For serving, cut the piles into vertical slices about ½in. thick.

Cutouts and fancy shapes: Fancy cutters used for biscuits—circles, diamonds, card suit shapes, and stars—add to the attractiveness of sandwiches, but are wasteful of bread so should not be used at present. However, small circles, diamonds, or stars can be cut from the centre of the top slice of a sandwich and replaced with bread of a different colour, the pieces being reversed on the next sandwich.

Toasted sandwiches: In small quantities toasted sandwiches can be made in an electric toaster, but for large numbers it is better to use the oven or griller. Thin sandwiches are suitable for suppers; larger ones with thick bread and liberal fillings will serve for a whole meal. Butter the bread, spread the filling, either savoury or sweet, and toast the sandwiches. With thick bread it is wise to toast the inner side lightly before putting in the filling. Such sandwiches may also be fried quickly in shallow fat. Toasting or frying is a good way of using up the sandwiches left over from a party; hot and tasty, and served with a green salad, they will be eaten by the family much more readily than if left in their original state, slightly dry and curling at the edges.

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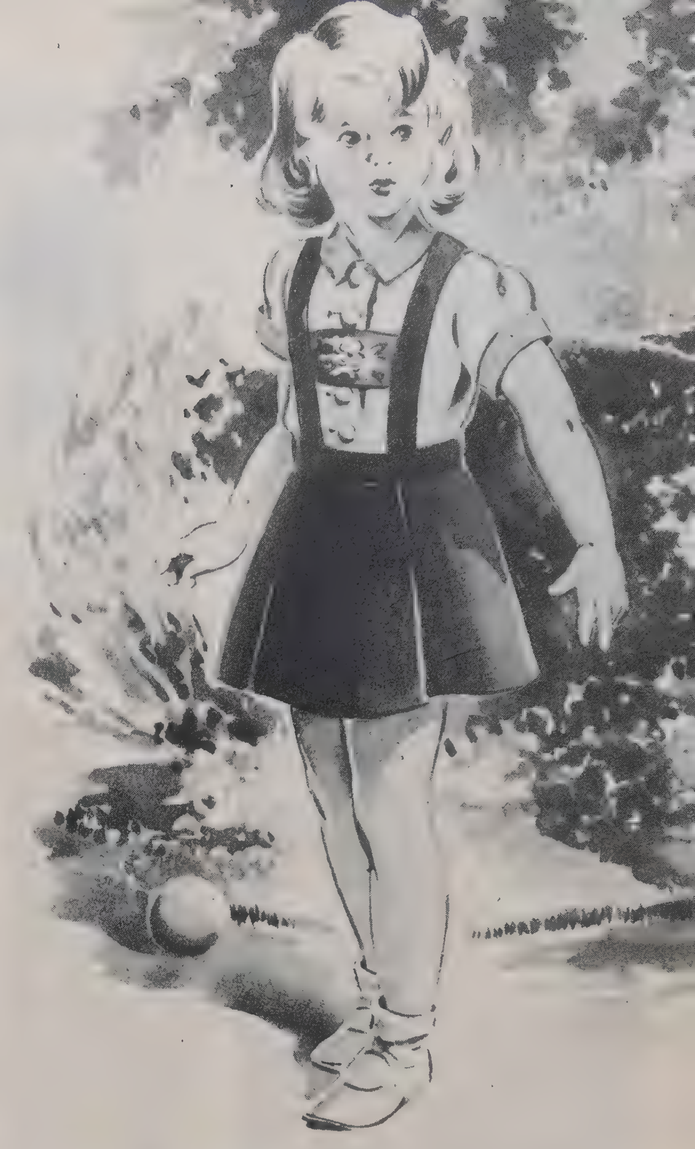
CLOTHING and HEALTH

COMFORTABLE, suitable, and pleasant to look at—those are three important criteria for clothes. Plenty is said on all sides about the third, but about the first and second much that is important is frequently not realised. This article by Eirene E. Unwin, Rural Sociologist, Department of Agriculture, Dunedin, contains information about clothing and its effect on health that should be of special value to people with children to dress, and ought to be of use to adults, too.



Until children grow hips, shoulders are the only secure place from which to hang their clothes. Shoulder straps may be made ornamented.

COMFORT should not be gauged only after incorrect clothes have been worn for so many years that the body has become used to them and is "uncomfortable" without them. Clothes may be comfortable to a healthy child, to a growing boy or girl, or to a young adult who has always dressed wisely, but similar clothes may not be comfortable to an older person who for years has forcibly supported muscles until they have lost most of their power of supporting themselves, or who has spoiled her natural posture with incorrect shoes. The comfort of the young, healthy body is considered in this article, and the first rule is that, to be healthy, clothes must not restrict.

Restrictive Clothing

Some very common restrictive garments are garters worn around the thigh, belts and waistbands on children too young to have any hips, knickers with tight elastic round waist and thigh, or tight or ill-fitting shoes, shrunken socks, and outgrown frocks too tight round the chest for growing girls.

Instead of garters round the thigh to hold up their stockings, small girls should wear bodices strapped from the shoulders to the suspenders, so that the stockings are really held up from the shoulders—the obvious place for the weight to come on a small, straight body with no other curves where support may be obtained. Elastic tight enough to hold up stockings constricts circulation and predisposes to varicose veins, and tight knicker elastic can be as bad as garters in this respect. Fabric bodices also give extra warmth in winter when it is needed, and in summer neither stockings nor anything to support them are necessary.

The waist measurement of small children, both boys and girls, is usually no smaller than their hip measurement, so suspender belts cannot be worn by small girls, and trousers or a skirt relying on a belt or waistband for support will not stay up unless the belt is pulled so tight as to be uncomfortable and harmful. Again the shoulders are the only place from which these clothes may be "hung," so small trousers should have braces or be buttoned on to shirts or tunics, which may be strapped for extra strength, and small skirts should be fastened to bodices of their own or made with ornamental braces or shoulder straps, worn over the jumper or blouse. Until children have developed waists and hips no attempt should be made to hold up their clothes with belts or tight waistbands.

When girls reach their 'teens they may find suspender belts more comfortable than bodices, but they should be worn only tight enough to hold up their stockings and are unnecessary in summer when stockings are not being worn. Tighter belts are uncomfortable, restricting, and unhealthy, and a suspender belt is quite sufficient for 'teen-agers, who should never wear corsets while they are still growing. Brassieres are unnecessary for the average 'teen-age girl, but if she does need them, they should be of the "uplift" variety and loose enough to allow ample freedom of movement for breathing.

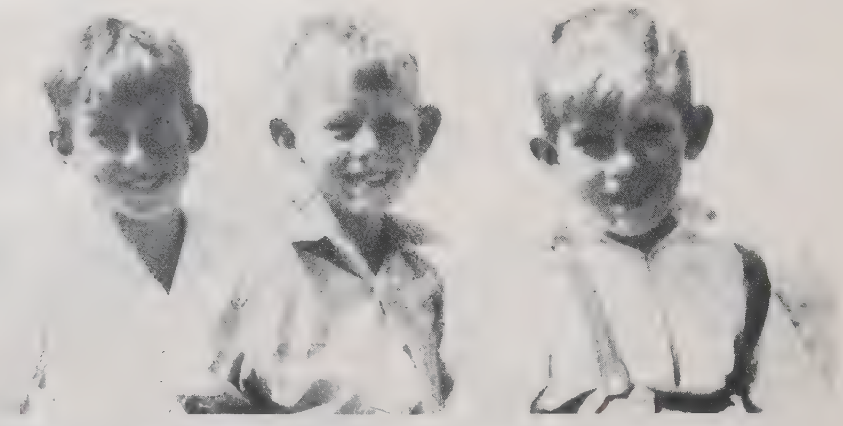
What is incorrect for children is usually unwise for adults, and that certainly applies to tight corseting. Fortunately women no longer attempt to give themselves "wasp waists" of 18in. or so, such as were fashionable at the end of last century, but much corseting is still very restricting because it is too tight and to that extent unhealthy. It is a pity when healthy, active girls spoil their firm stomach muscles by making corsets do the work these muscles ought to do. Muscles are like people: If their work is done for them for too long, they tend to become lazy and do not function very well when asked to work again themselves. Therefore, it is best to wear foundation garments which fit comfortably and are just sufficiently tight to do their work—that is, give a feeling of some support and hold up stockings. They should not be relied on for so much support that they cannot be dispensed with when not needed for stockings.

Shoes are dealt with at greater length later in this article, but ill-fitting or tight shoes and shrunken, tight socks are as serious a form of unhealthy clothing as any.

Winter Clothing

As important as freedom from restriction is free access of air to the body. If clothes are loose enough not to restrict, ventilation is usually assured. In winter when

THE EFFECT OF CLOTHING ON HEALTH



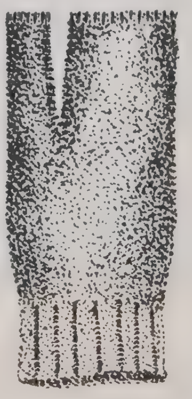
Suitable and sensible everyday clothing for small boys. Left—Straps over the shoulders hold up the brief summer shorts. If the straps are crossed at the back, they do not slip off the shoulders readily. Above—Excellent summer wear, light in weight, loose fitting, and open at the neck.

warmth is important this can best be obtained by several layers of loose, light garments rather than fewer layers of thick, heavy ones. Clothes made high and snug-fitting at the neck to keep the warmth of the body from escaping too readily are warmer than clothes with loose, low open necks, which allow the warmed air to escape freely and are more suitable in summer. That does not mean that winter clothes should be tight over the whole upper part of the body; a snug-fitting neck line is all that is suggested.

When clothing children in cold weather it is important that not only their bodies but their legs should be kept warm. It is ridiculous to put warm underclothes, frocks, cardigans, and coats on small girls and then let them go out into the cold with short socks and legs bare from the ankles to half-way up the thighs. Their stockings and knickers should be long enough to meet, but the stockings should be supported from a bodice and any elastic in the legs of the knickers should be just snug and not tight. Skirts, too, should be a reasonable length; nothing is gained by making them so short that they tend to become merely a little frill. Perhaps a better alternative to stockings and skirts is long trousers, with or without a bib, supported from the shoulders. These can be made of warm material and are eminently suitable for both small boys and small girls, in country and town, and they can be very attractive.

Skirts and stockings are usually worn by bigger girls going to school, as trousers may be considered too juvenile for school wear, and for older boys shorts and socks are usually sufficiently warm. Winter shorts for small boys may present something of a laundry problem, which can largely be solved by letting them wear underpants of either woven or interlock cotton material, which may be boiled frequently without deterioration. The woollen trousers thus need not be washed very frequently and so will last much longer. The underpants also add a little extra warmth, and that is important, for when boys wear shorts so much of the legs is bare that warmth round the thighs is essential. Cotton underpants are equally useful worn under short or long trousers.

Extra warmth for children's hands and arms may also be necessary on cold mornings, and useful mittens can be made from the legs of men's worn-out socks. With the foot cut off, a small piece stitched separately for the thumb, and the cut edge buttonholed, these mittens can be pulled up over the sleeves of cardigans, jumpers, or frocks, not only giving extra warmth over arms and hands but protecting cuffs from soiling and wear.



However, just sufficient clothing for warmth, and no more, is all that is required. A great number of garments is not necessarily a protection against colds; the reverse is more nearly true. A person who is overheated is far more likely to get chilled, and it is sudden chills that predispose to colds.

Summer Clothing

In summer, also, the wearing of too many clothes should be avoided. Overheating is even more likely in hot weather and just as dangerous. Children should be encouraged to go bare legged and wear loose, open-necked cotton clothes, and as few of them as possible, but to have a cardigan or jumper available to put on during the cooler hours of the day.

The head and back of the neck should always be protected from hot sunshine and the eyes shaded from glare, so the habit of wearing a shady hat in sunny weather is an excellent one to inculcate into children. This necessity is not reduced when the children grow into adults.

White, untanned skin should also be protected from direct summer sunshine except for short periods. Once skin is tanned it may be exposed to the sun for hours at a time with little or no harm, and then sunbathing is an excellent habit, as exposure to sunlight is an important method of obtaining vitamin D. A substance under the skin is changed by the ultra-violet light in summer sunshine into vitamin D. This vitamin is essential for the formation of good bones and teeth and, as it is difficult to obtain without recourse to cod-liver oil, controlled sunbathing is a cheap and pleasant way of obtaining this necessary substance.

However, it is important that the sunbathing be controlled and not overdone at first. Sunshine produces vitamin D in tanned as well as in white skin, but if white skin is exposed to the sun's rays for too long at a time, painful sunburn results and other harmful substances are formed in the skin which more than offset the good effect of the vitamin D produced. Once the skin is tanned, sunburning with its painful and sometimes harmful consequences is less likely to occur, but sunburning does nothing to hasten the tanning process. Before tanning has been accomplished (and with some very fair-skinned or red-headed people it is never accomplished), sunshine must be taken only in small doses, but the length of exposure may be increased gradually each day as the skin tans.

Meanwhile, if it is necessary to be outside in the sunshine for long periods, and the skin is not tanned, loose, light-weight clothes, with long sleeves and preferably white or light coloured, should be worn, though the fabric must not be so light a weight that the sun may burn through it.

Night Wear

If possible, different night clothes should be worn in summer and winter. In summer the same rules of wearing loose, light, open-necked garments should be observed by night as by day.

Cosy and safe from chills between bath and bedtime on cold winter nights.

In winter warm pyjamas or nightdresses, in which the feet can be tucked if necessary, are wise, as too frequently really-cold feet prevent sleep.

It is essential not to get cold before going to bed, and that is particularly likely to happen after a bath. If children are bathed before their tea—a convenience for the busy mother—or if for any other reason they do not go to bed at once after their baths, they should wear warm gowns over their night clothes to avoid any chance of chills. The dressing gowns should fasten securely in front and be long enough to keep the legs thoroughly warm. Warm slippers should also be worn.

It is not a good plan for a child or an adult to wear the same singlet day and night. The garment has no opportunity to air and the dampness absorbed from the body remains unevaporated. It also becomes dirty very much more quickly, and one really-grimy singlet is much harder to wash than two that are but lightly soiled. In any case, the necessity of wearing a singlet at night is doubtful.

Fabrics and Textiles

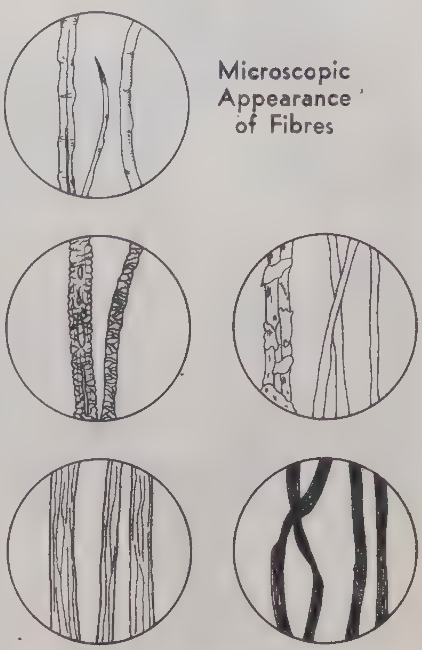
The textile fibre of which yarns and fabrics are made has a great influence on the finished cloth and on the garments made from it. The chief textile fibres used for clothing are wool, cotton, linen, and various sorts of rayons or artificially-made fibres. These all vary in chemical make-up, microscopic appearance, and physical properties. It is largely the physical properties which cause the obvious differences between finished fabrics, but only some of these are relevant when considering clothing and health.

One of the most important properties of wool is its capacity for enclosing many small pockets of stationary air, both round each rough, scaly fibre and between the many fibrils which go to make up the yarn and the fabric. The presence of all this air, which is a very poor conductor of heat, means that woollen material is itself a non-conductor, and because it thus prevents loss of natural warmth from the body woollen material is warm. Weight for weight it is very much warmer than cotton, even fleecy-lined interlock or flannelette. Hence, though sufficient warmth can be obtained from either wool or cotton, woollen clothes are lighter, looser, and less restricting than cotton clothes of equivalent warmth.

Wool also will absorb perspiration without feeling damp. It can absorb up to 30 per cent. of its own weight of moisture and still feel quite dry. This property means that woollen garments will remove perspiration from the skin and not feel moist or clammy, which again means that they continue to feel warm. However, it also means that woollen clothes should be aired thoroughly when they are taken off to allow the moisture to evaporate. Frequently woollen garments that are apparently dry feel moist if they are warmed because the moisture previously absorbed is being driven out of the wool and evaporated by the heat; only when this moist feeling is quite gone, and the clothes feel thoroughly dry and warm at the same time, has all the moisture been evaporated and the clothes thoroughly aired.

Conversely, if wool meets cold, damp air it generates heat and so is warmer under such conditions than other materials.

Wise winter and summer wear. Left—An excellent rig for snowy weather, warm and snug from top to toe. Right—Smart shorts buttoned to a light shirt are loose and comfortable in summer.



Microscopic Appearance of Fibres

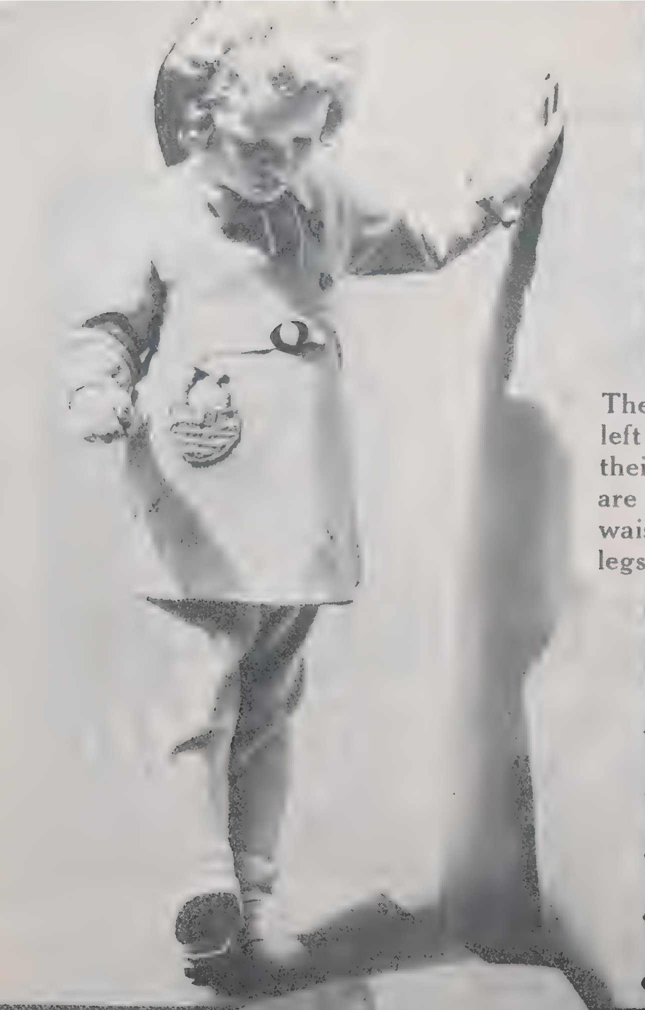
Upper—Flax. Middle left—Wool. Middle right—Raw silk and degummed silk. Lower left—Rayon. Lower right—Cotton and mercerised cotton.

Obviously, wool is the best material for winter clothes; it is non-conducting, warm, moisture absorbing, and able to generate heat within itself, and yet is light and airy. Some people cannot wear wool next to the skin, as it irritates them. Such people are unfortunate, but should not go without woollen clothing altogether; they should wear cotton next to the skin and woollen garments over it.

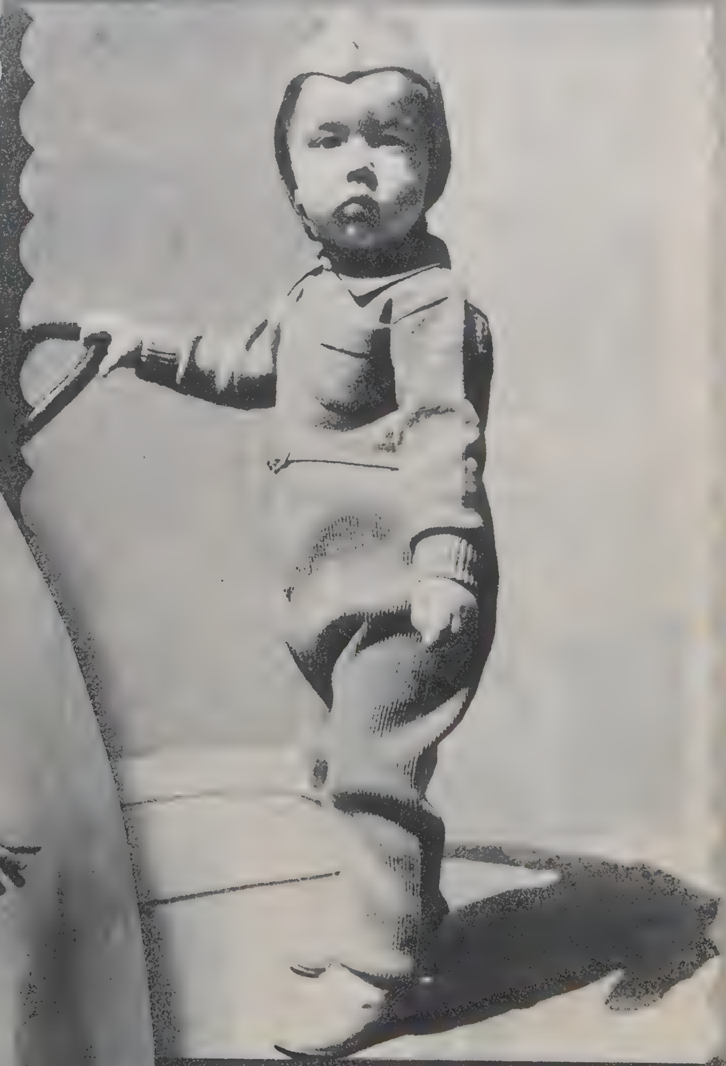
Wool has one other very valuable property: It is fire resistant. It will burn, but if set alight, it will only smoulder, whereas cotton and some rayon materials tend to flare up easily if they come against even a heater or a cigarette butt. This is most likely to happen when the material has a fluffy surface, such as that of flannelette, and this unfortunate property means that flannelette is a dangerous material for nightdresses and pyjamas for small children. Cotton interlock and the less fluffy types of pyjama cloth are quite good, but better still are soft woollen fabrics, if not too irritating, or wool-cotton mixtures if these are available.

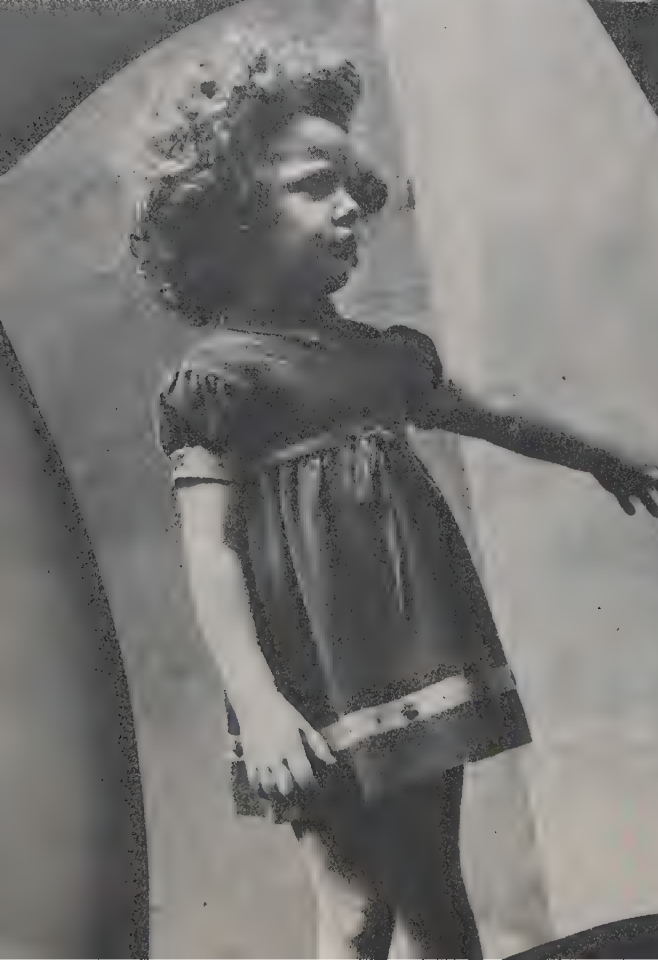
For summer underclothes machine-knitted silk and cotton, or pure cotton, and locknit are all available with little difference between prices. Locknit is invariably made of one or other of the rayons and is non-absorbent, which means that it feels damp with very little perspiration. Cotton and silk-cotton mixtures are more absorbent and so are more suitable for garments worn next to the skin, and they are a better protection than locknit against the chills likely to be caused by the changes in temperature which can occur even in summer.

Knitted Wool is for WINTER Wear

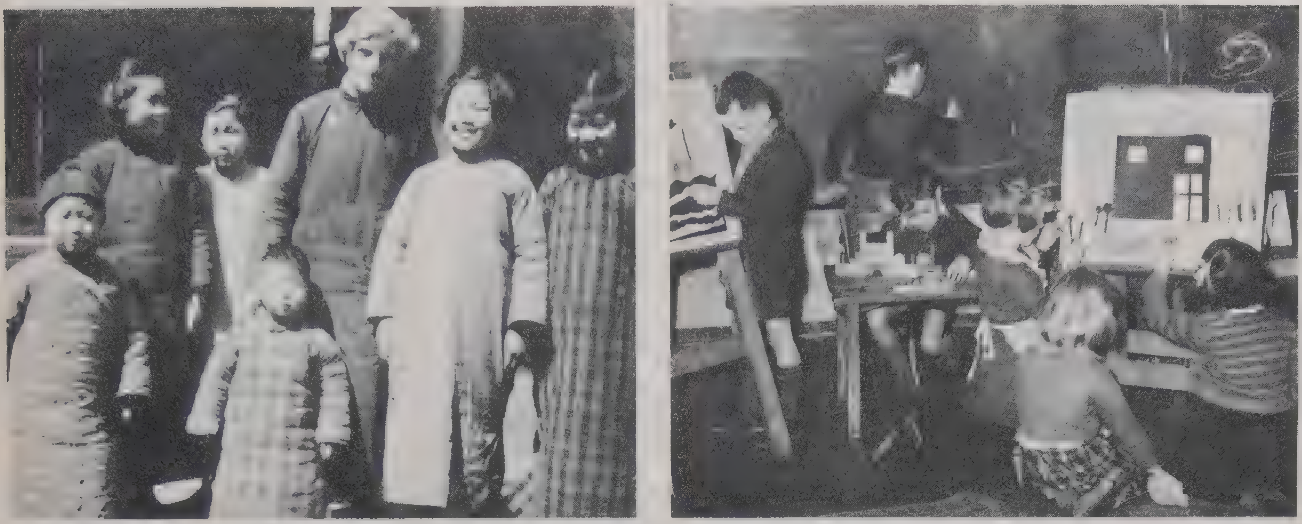


The fabric and style of the outfits at the left and below are eminently suited to their purpose. Among their good points are snug necklines, absence of tight waistbands, warm covering for arms and legs, and protection for ears and heads.





The frock on the left would be charming for hot-weather wear if it were made of light silk or cotton material, but to dress a child in a knitted-wool garment and leave the legs and arms bare is ridiculous.



National Publicity Studios photo.

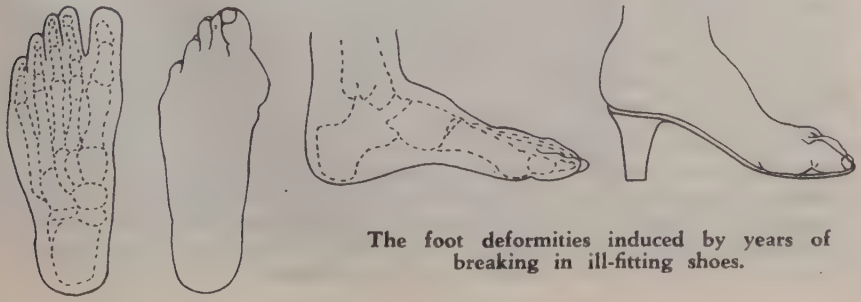
Left—Chinese children dressed in padded cotton. With such garments sufficient warmth can be obtained only with much padding. Right—New Zealand children dressed in wool, which gives warmth with little bulk. The girls are wearing stockings or long socks. The boys are wearing sensible indoor shoes with straight inner lines and flat heels; boots are unnecessary for indoor wear or for any but the wettest and muddiest conditions outdoors. The shoes of the girl nearest the camera are not the best; the inside line should be straighter.

Footwear

Neither shoes nor socks or stockings should restrict children's growing feet in any way. Above all, shoes should fit—that is, they should be the same shape as the foot, neither too small nor, as often happens with children's shoes, too large. This means that the inside line should be straight right up to the big toe, making the shoe longest over the first and second toes and not over the third toe, as is usual in a pointed shoe. The width, length, and height above the toes should be sufficient to allow the foot to move naturally when walking or standing. Heels should be flat.

If a pair of new shoes has to be "broken in" before they are comfortable, what usually happens is that the feet become "broken in" to the shoes, for a child's foot tends to be more flexible than new leather. Years of such "breaking in" produce permanently-deformed and usually painful feet. When new shoes are being bought for children or adults, if possible the feet should be measured for arch length, width, and over-all length. It cannot be over-emphasised that children's shoes must be long enough. Too short a shoe can cause as serious deformities as one that is too narrow or otherwise ill fitting. Hammer toes, in-growing toenails, and enlarged toe joints frequently are lifelong results.

All children's shoes should have flat heels, and in this respect adolescent girls are still children. Even a cuban heel is too high for girls in their 'teens. The evils of high heels also cannot be over-emphasised. They force the front of the foot down into the toe of the shoe, producing the effect of insufficient length with its attendant foot deformities. They throw the weight that should be taken by the heel forward on to the ball of the foot, so tending to enlarge the toe joint, and this is emphasised if the inside line of the shoe is not straight, but bends in to a point. An enlarged big toe joint leads almost automatically to corns and bunions in later life. The ill results of high heels do not stop at the feet. They throw the whole posture out and accentuate the figure difficulties of protruding abdomen and buttocks. Their effect is cumulative, for with years of wearing them the tendons up the backs of the legs become shortened. This shortening and the other figure difficulties mentioned are caused by the continual effort to hold the body erect made necessary by the tendency of the high heels to throw it forward. Once these tendons are shortened the wearing of



The foot deformities induced by years of breaking in ill-fitting shoes.

This style of children's outdoor clothing is seen all too frequently—plenty of covering over the body and arms, but the legs exposed to the cold.

VISIT OF THE DUKE OF GLOUCESTER

["Weekly News" photo.

During his stay in Auckland the Duke attended the Auckland Racing Club's summer meeting at Ellerslie, where he presented the Auckland Cup to the owner of Gold Trail, the winning horse in the cup event. In this group, photographed after the presentation, the Duke is standing on the left, the Governor-General, Lord Bledisloe, is third from the right, and Lady Bledisloe (partly obscured) is second from the right.

towns since the earthquake disaster of 1931.) From Opononi in the north to Oreti in the south, New Zealand's beautiful beaches provided him with plentiful opportunities to indulge in this exhilarating pastime, and on Christmas Day, when he was the guest of Their Excellencies the Governor-General and Lady Bledisloe at a picnic under the pohutukawas at Piha, he had a glorious time in the water with his surfboard before returning to Government House to dine and stay up till the early hours of the morning to hear the Christmas message broadcast by the King from Sandringham. Incidentally, it was a young Gisborne lad who, completely unaware of his stalwart fellow-swimmer's identity, innocently advised the Duke as to the best method of manipulating his surfboard. On New Year's Day, however, he forsook his surfboard in favour of the saddle, and, gorgeously attired in his racing silks of emerald green and gold, he rode the topweight into fourth place in the Ladies' Bracelet, one of the amateur events at the Marton meeting, to the rousing accompaniment of a "good luck" haka performed by the local Maoris. At the finish of the race the crowd cheered him and sang "For He's a Jolly Good Fellow."

Flight over Lakes and Mountains

During his 16-day stay in the South Island he had the memorable experience of viewing Southland's scenic jewels of lakes and mountains from the air, his Puss Moth being piloted by Flight Lieutenant M. Buckley. (Shortly before he left for the south he presented the Palmerston North aviators, McGregor and Walker, with the medals they had won in the Melbourne Centenary Air Race.) The Duke's portable cinematograph camera was in constant use during his New Zealand travels, so rich did he find the country in natural beauty. He made a full-length film of tree-felling operations in the unique kauri forests of the far north, as well as photographing many of the province's picturesque spots which are steeped in history and romance. The site of the small stone church at Paihia, were he worshipped with the Governor-General, was the first consecrated soil in New Zealand, and he commemorated his visit to the colony's birthplace, Waitangi (the generous gift of Lord and Lady Bledisloe to the nation), by planting a pohutukawa in front of the Treaty House.

The Duke spent his last day in the Dominion deep-sea fishing, being photographed with his catch, a 232lb. striped marlin, secured after an exciting struggle. He sailed on the first stage of his homeward trip on January 29, the Anniversary of the founding of Auckland City, and as H.M.S. Australia put to sea from her sheltered anchorage in the Bay of Islands the plaintive strains of the Maoris' songs of farewell followed from the shore. . . .

["The Evening Post" photo.

The guard of honour from the 1st Battalion of the Wellington Regiment being inspected by the Duke outside the Wellington Town Hall.

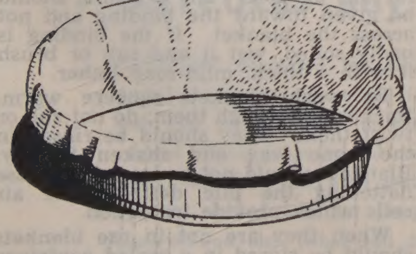
MAKING AND USING HOME-MADE SOAP

By EDITH G. McNAB, Rural Sociologist, Department of Agriculture, Dunedin.

NOW that caustic soda is coming back on the market in New Zealand, many country housewives will wish to make their own soap again, thus using up fat which otherwise may be wasted. An additional reason for making soap at present is that when fat is used for soap making instead of being thrown out either more fat or more soap is made available for export to countries where both are still very scarce. It has been calculated that one large bar of laundry soap is equivalent to the lard ration of a person in England for 36 weeks.

THE ingredients required for home-made soap are 7lb. of fat, 1lb. of caustic soda, and 3 pints of water. The fat must be clean and free from salt. If necessary, it should be clarified before use. To do this, add some water to the cold fat and boil it for a few minutes. Allow it to cool, and when the fat has set lift it off the top of the water. Scrape the bottom of the cake of fat if it has any impurities sticking to it. The clarifying process may be carried out more than once if required. Do not weigh the fat until it has been clarified.

Both the fat and caustic soda must be weighed accurately. If there is too much fat for the quantity of caustic soda used, some of it will not be turned into soap but will remain in the mixture as fat; a lather will be more difficult to obtain and some of the soap will be wasted in emulsifying the fat. If there is too much caustic soda, some of it will be left free, as there will be more than enough to combine with all the fat to make soap; free caustic soda is undesirable, as it makes the washing water more alkaline and harder on the skin of the hands and also makes the soap less suitable for certain kinds of washing—for example, if it is used to scrub wood, it will tend to make it yellow. It is most important that the proportions given be adhered to.



The soap is poured into a cloth-lined mould to set. A galvanised tub is suitable, but any container which will produce soap of a thickness convenient for cutting into bars will serve. For a large quantity a dry washtub may be used provided the taps do not drip.

Warm the 7lb. of clean fat until it just becomes liquid. Do not heat it any longer than is necessary to change the fat from solid to liquid. Dissolve the caustic soda in the water, using a tin or some vessel which is kept for the purpose. This solution will become hot. Pour the caustic soda solution gradually into the melted fat, stirring with a stick or wooden spoon which is used for nothing else. Keep on stirring until a creamy mass results; this should not take long. Have ready a tub or basin lined with cotton cloth and pour the soap into it. After 24 hours the soap may be removed from the mould and cut up into neat bars or pieces.

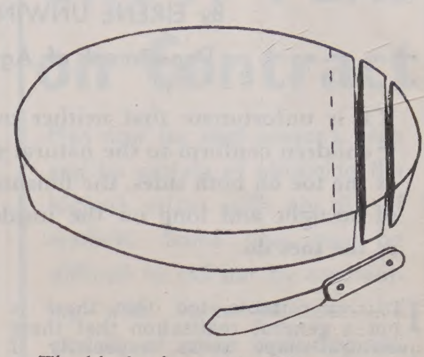
It is better stored for some time before it is used. A month at least is recommended. The period of storage helps to make sure that the combination of the fat and caustic soda is complete and that the soap dries out a little, so that it does not dissolve in water so easily that it is wasted in use.

Though the essential ingredients are the fat and caustic soda, some recipes for soap include other substances. For special purposes additions to the ingredients may be worth while, but often they mean only extra trouble and expense for which there is no compensating increase in efficiency of cleansing.

Precautions with Caustic Soda

Take great care in handling the caustic soda, whether it is solid or in solution. Never allow it to come into contact with the skin, for it can cause a serious burn. If any should be spilled on the skin, wash it off immediately in plentiful running water and finish with a rinse of vinegar diluted with water.

Avoid splashing or spilling the caustic soda solution on to walls or floor; it will take off paint and remove the surface from linoleum. When a caustic soda tin is emptied, wash it out with plenty of water before discarding it; children have died through drinking rain water collected in caustic soda tins which had been thrown out unwashed. When storing caustic soda always keep the lid on the tin, to prevent deterioration of the caustic soda, and place it out of the reach of children. Small children should be safely out of the way while soap is being made at home. Caustic soda tins always carry directions for first aid should any be swallowed accidentally, but it is best to take such care that accidents are prevented.



The block of soap should not be left more than 24 hours before being cut or it will become too hard. A strong knife with a comfortable handle and a blade which is not too flexible is required.

Use of Home-made Soap

Soap made by the method described is suitable for ordinary household cleaning, for dish washing, and for washing cottons and linens. It is not suitable for washing silks, rayons, or woollens.

The cleaning action of soap depends on several factors: The wetting power of water is increased, so that it is easier to wet articles in soapy water than in plain water, and this is of importance in cleaning by washing. Soap breaks up grease into tiny droplets; dirt particles are broken up by scrubbing, rubbing, or the action of a washing machine or of boiling; then both droplets and dirt particles are loosened from the soiled article, held suspended in the soapy water, and may be removed with it.

In washing clothes it is most important that the dirt and grease remain suspended in the washing water and do not settle out again on the clothes. Dirt which is redeposited in fabric is more difficult to remove than the original soiling material. Therefore clothes should never be left standing in dirty water, nor should they be left boiling or in a washing machine too long. In any of these circumstances dirt may tend to settle out again. Seven to 10 minutes is sufficient for boiling, and when a machine is used clothes should not be washed for longer than the time recommended by the makers. For the best results, the first rinsing water should be at the same temperature as the washing water. This helps to ensure thorough removal of the dirty water and to prevent the development of a grey colour caused by imperfectly-removed or redeposited dirt.

Knitting "Foot-shape" Socks for Children

By EIRENE UNWIN, Rural Sociologist,
Department of Agriculture, Dunedin.

IT is unfortunate that neither machine nor hand-knitted socks for children conform to the natural shape of the foot, but are decreased at the toe on both sides, the finished shape being a blunt point instead of straight and long on the inside and sloping back to the outside as the toes do.

IT is regrettable, too, that there is not a general realisation that these unnatural-shape socks, especially if they are a little tight or too short, can do much permanent damage to the shape of children's feet. Their pressure, particularly on the big toe, is gentle but steady, and with the bones of the young feet still sufficiently flexible to give way to such steady pressure, a permanently-deformed foot may result. Shoes, of course, are also very important, but loose socks of the right shape can be as important in preventing later foot troubles as the best shoes obtainable.

The Plunket Society has long advocated the use of right and left socks shaped to fit the feet of a child, and the pattern given below for knitting "foot-shape" socks with a straight inner side is based on that published in "Modern Mothercraft," official handbook of the Royal New Zealand Society for the Health of Women and Children, 1948 edition, p. 225.

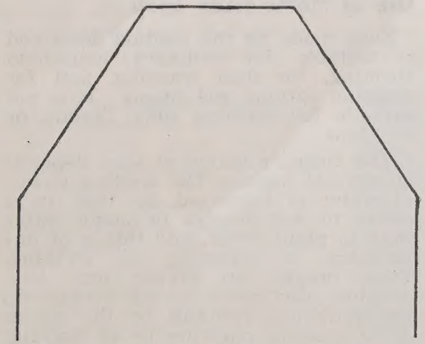


Fig. 1—The usual shape of the toe of a child's sock.

Shaping of the Toe

No special pattern is needed until the shaping of the toe is reached. For this ordinary patterns usually give directions for decreasing two stitches on both sides every second row, which produces the shape shown in Fig. 1. Instead, knit as follows:—

Decrease 2 stitches **every** row, but **on one side only.** This decreases as rapidly as before, but produces a different shape.

Continue thus until all but 2 decrease rows remain to be done or until there are 28 stitches on the needles. If the knitting is very fine, more stitches may be necessary; if the socks are very small, fewer stitches are needed, but only 2 more rows are necessary at this stage to complete the sock.

Decrease 2 stitches on each side of the sock for each of the remaining 2 rows, reducing the number of stitches to 20.

Cast off and sew up or graft the two edges together.

Knit the second sock with the decreases on the other side to produce a right and left sock.

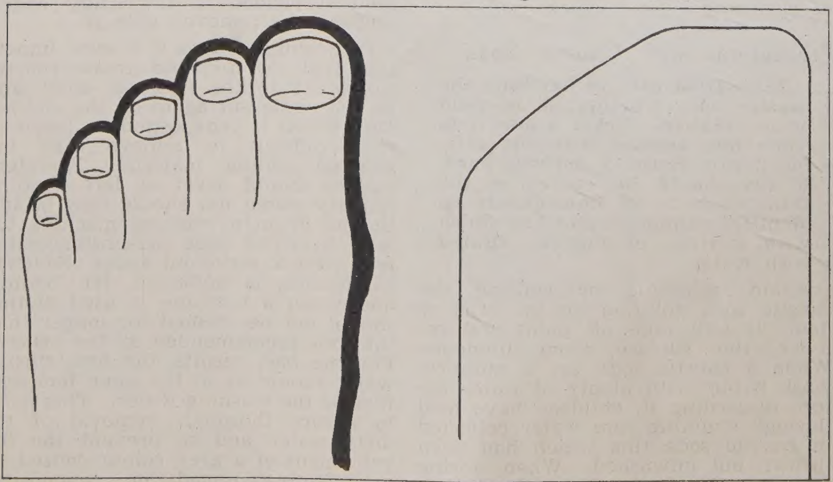


Fig. 2—A "foot-shape" sock, showing how it conforms to the natural shape of the foot.

The shape of these socks is illustrated in Fig. 2, which shows how well they compare with the shape of the natural foot.

Danger of Short Socks

Because children's feet grow so fast and because woollen socks shrink, it is not long before socks become too short. As it is more dangerous to wear socks that are too short than it is to wear socks of the wrong shape, they should either be put aside until a younger member of the family can use them, or if the original wearer is to continue using them, a new toe should be knitted. To do this unknit the decrease rows, add another straight inch, and reknit the toe. Lengthening the sock, beside producing an article that will not tend to deform the child's toes, will take tension off the heel and toe, and will thus prevent rapid wear.

The toes of bought socks can be reknitted both to lengthen them if necessary and to give each foot the right shape. The original toe may be cut off rather than unknitted, the stitches picked up on a fine needle, and a new toe knitted. The adoption of this method will facilitate any further lengthening of the socks later, as the somewhat tedious work of picking up the fine machine stitches has already been done and need not be repeated, provided some hand-knitted rows are left intact when the toe is unknitted.

Children using foot-shape socks have to be trained in the correct use of left and right socks. They should be taught carefully to compare each sock with the shape of their feet before putting them on, and the operation will soon become as automatic as putting on gloves correctly.

Care of Blankets

PROPER care of good-quality blankets will keep them in good condition and extend their life. Between times of washing blankets should be brushed to remove dust and dirt and to keep the nap soft and fluffy. A whisk brush is most effective for this purpose. The brushing should be given toward the binding and not across the blanket. If the binding is badly soiled, wet it and rub or brush it with a thick, mild-soap lather.

To wash blankets squeeze warm, thick suds through them; do not rub or twist them. They should be rinsed in the same way and shaken to dry. Blankets should not be ironed, because flattening the pile destroys the air cells which provide insulation.

When they are not in use blankets should be stored in a sealed container or in a special blanket box in a cool, dry place. Moth-proof wrapping paper sealed tightly around loosely-folded blankets usually gives sufficient protection during storage in summer. When blankets are stored they should not be weighted down by having other articles piled on top of them.

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